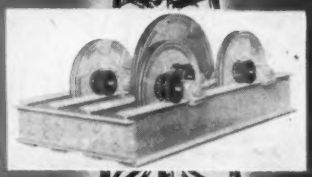
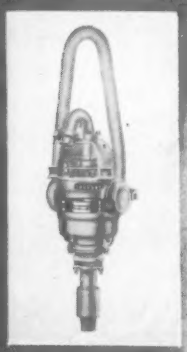
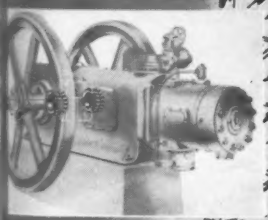
the OIL AND GAS JOURNAL

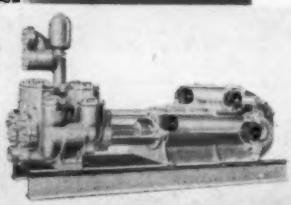
From Derrick Crown to Derrick Floor

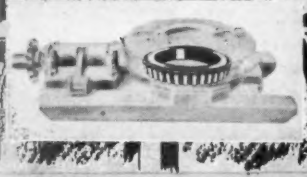
Timken Bearings keep things moving











In engines, drawworks, rotaries, swivels, crown blocks, traveling blocks, slush pumps, compressors and other equipment, Timken Tapered Roller Bearings help to drill oil wells faster, deeper and more economically.

They not only minimize friction, thereby simplifying lubrication and saving lubricant, but by safely carrying all loads — radial, thrust and both together in any combination — and holding moving parts in correct and constant alignment, they greatly increase equipment endurance and life; help prevent involuntary operating interruptions; and substantially reduce maintenance.

No matter how deep your contemplated new wells may go, you will be able to drill them faster at lower cost if your equipment contains Timken Bearings. The Timken Roller Bearing Company, Canton 6, Ohio.

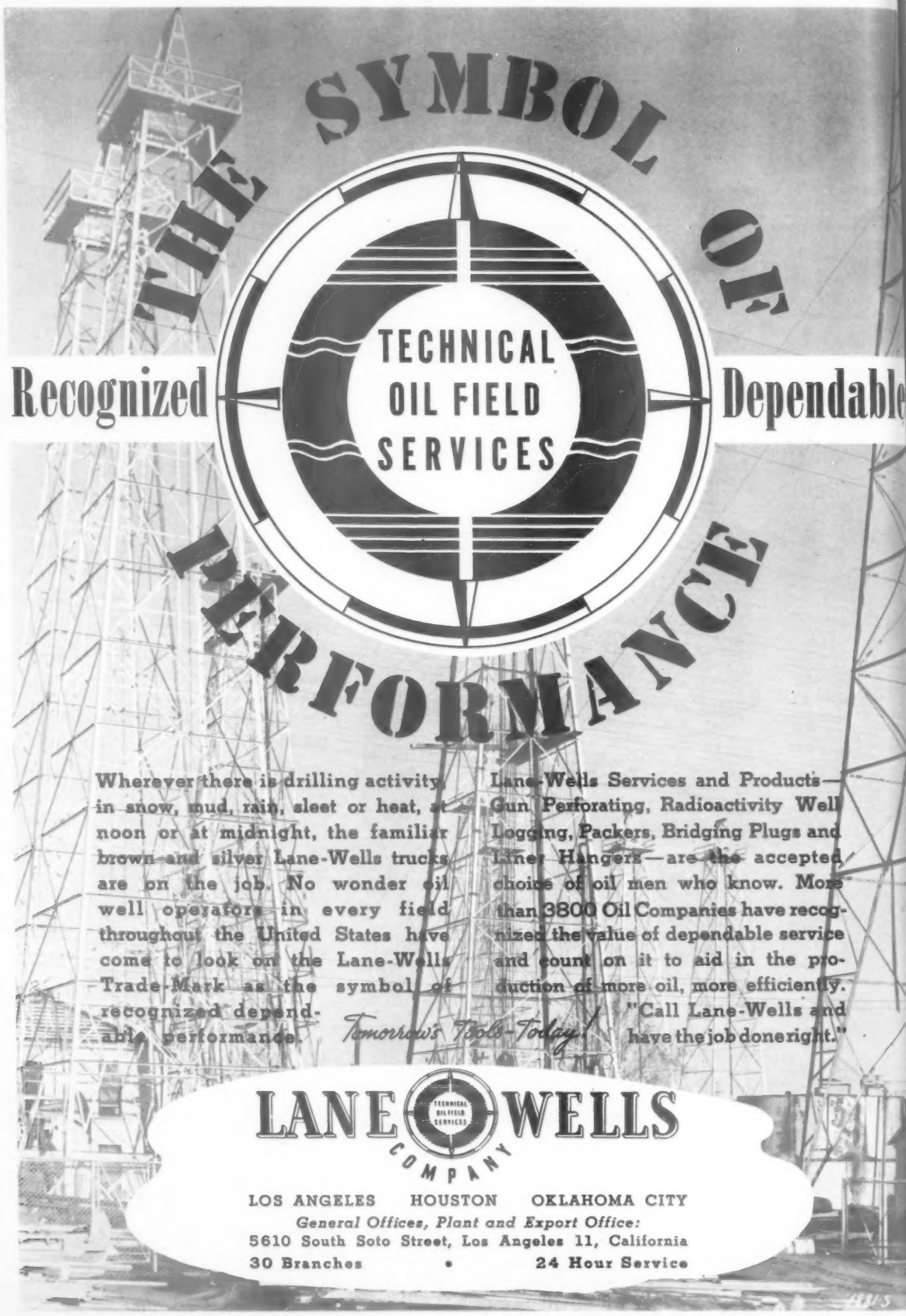
TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

PRICE 20 CENTS

JANUARY 20, 1945


THE SYMBOL OF
Recognized
TECHNICAL
OIL FIELD
SERVICES
Dependable
PERFORMANCE
Wherever there is drilling activity, in snow, mud, rain, sleet or heat, at noon or at midnight, the familiar brown and silver Lane-Wells trucks are on the job. No wonder oil well operators in every field throughout the United States have come to look on the Lane-Wells Trade-Mark as the symbol of recognized dependable performance.
Tomorrow's Tools—Today!
Lane-Wells Services and Products—Gun Perforating, Radioactivity Well Logging, Packers, Bridging Plugs and Liner Hangers—are the accepted choice of oil men who know. More than 3800 Oil Companies have recognized the value of dependable service and count on it to aid in the production of more oil, more efficiently. "Call Lane-Wells and have the job done right."
LANE WELLS
COMPANY
LOS ANGELES HOUSTON OKLAHOMA CITY
General Offices, Plant and Export Office:
5610 South Soto Street, Los Angeles 11, California
30 Branches • 24 Hour Service

the OIL AND GAS JOURNAL

published weekly by the

PETROLEUM PUBLISHING COMPANY

211 S. CHEYENNE AVE., TULSA 1, OKLAHOMA

Subscription rate to the petroleum industry, United States and foreign, 1 year, $6.00; 2 years, $10.00; 3 years, $12.00; 5 years, $15.00. Single copies, 20 cents. Back copies, when over a year old, 50 cents. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879.

Copyright 1945, by The Petroleum Publishing Co.

Vol. 43, No. 37 January 20, 1945

P. C. LAUINGER, *President* — C. O. WILLSON, *Editor*

R. H. ROURKE, *Business Manager* — H. STANLEY NORMAN, *Managing Editor*

R. C. MAC DOUGALL, *Circulation Manager* — ARCH L. FOSTER, *Refining Editor*

W. L. NELSON, *Technical Editor* — PAUL REED, *Pipe-Line Editor*

Associate Editors

LYNN M. NICHOLS — NEIL WILLIAMS

CHARLES J. DEEGAN — KENNETH B. BARNES

R. B. TUTTLE

District Editors

JAMES McINTYRE, Tulsa 1, 211 S. Cheyenne Ave. — THOMAS F. SMILEY, Tulsa 1, 211 S. Cheyenne Ave.

TOLBERT R. INGRAM, Denver 2, State Office Bldg. — E. H. SHORT, JR., Houston 2, Sterling Bldg.

HENRY D. RALPH, Washington 4, Natl. Press Bldg. — L. P. STOCKMAN, Los Angeles 14, Union Oil Bldg.

A. C. MacINTYRE, Oil City, Derrick Bldg. — O. C. PRESSPRICH, Saginaw, News Bldg.

VICTOR LAURISTON, Chatham, Ont., 35 Stanley Ave.

Advertising

E. KLAPPENBACH, *Vice President*

KENNETH J. LANGLEY, *Eastern Manager*, New York 17, 415 Lexington Ave. — CRAIG ESPY, *Pittsburgh Manager*, Pittsburgh 19, Grant Bldg.

C. R. FARMER, *Chicago Manager*, Chicago 2, 185 W. Madison — J. HOWARD TINKHAM, *California Manager*, Los Angeles 15, 1402 S. Grand Ave.

WAYNE RIVES, *Gulf Coast Manager*, Houston 2, Sterling Bldg. — A. J. CHAMBERS, Beckenham, Kent, England, 33, The Avenue

MITCHELL TUCKER, *Manager, Research Dept.*, Tulsa 1, 211 S. Cheyenne Ave. — JOHN D REILLY, *Production Manager*, Tulsa 1, 211 S. Cheyenne Ave.

Member
Audit Bureau of Circulations
Associated Business Papers

Table of Contents

NEWS DEVELOPMENTS

War Developments Create Tighter Transportation Situation . . 44
PAW Makes Upward Revision of Its Production Program . . . 45
PIWC Told Materials Will Grow Even Tighter . . . 45
Committee Seeks to Base Ceilings on Replacement Costs . . . 46
Anglo-American Oil Pact Withdrawn from Senate . . . 48
Higher Demurrage Charge Is Applied to Unloading Only . . . 49
Coleman Resigns as PAW Program Director . . . 49
Critical Situation Confronts Nation's Producing Operations . . 50
Automotive Engineers Dedicated to Victory . . . 52
Mexico's Oil Budget Looks to Expansion in 1945 . . . 55
Deaths in the Industry . . . 56

Trends . . . 43
This Week . . . 47
Editorial . . . 51
Natural-Gas News . . . 95
Refining News . . . 96
Pipe-Line News . . . 98

ENGINEERING AND OPERATING

Refining Mixtures of Kansas-West Texas Crude Oil . . . 58
Mechanics of Production Series—No. 12—Molal, Weight, and Volume Composition . . . 64
Drilling Sites Pose Engineering Problems in Louisiana Field . . . 72
Isomerization of Normal Heptene . . . 77
Unitized Boiler Feed-Water Pump Assembly . . . 78
Mechanical Drilling-Time Recorder Improves Efficiency . . . 80
Versatile Pipe-Bending Machine . . . 82
Oil and Gas Equipment Digest . . . 89

Progress in Metals . . . 68
Operating Ideas . . . 79
Eng. Fundamentals . . . 85
Refiner's Notebook . . . 87

EXPLORATION AND DRILLING

Week's Highlights . . . 101
Completions in All Fields . . . 101
Daily Average Production for Week . . . 102
Reports by Areas Start on Page . . . 102
Wildcat Completions and Discoveries . . . 113

ADDITIONAL FEATURES

Drilling Contractors . . . 114
Market Summary . . . 115
Personals . . . 116
Classified Advertising . . . 118
Events on the Calendar . . . 120
Index to Advertisers . . . 120

BACK in 1908, five years after the Wright Brothers first flew, Ed Hanlon built his first plant to produce Natural Gasoline. This vital fuel, partner of gasoline, has contributed much toward the growth of the automobile and airplane, helping give us the American Way of Life — is doing more in helping us preserve that freedom. With peace, STA-VOL-ENE the "Natural" known throughout the World is ready for the highway and the many new developments forecast for tomorrow.

Hanlon-Buchanan, Inc

PIONEER NATURAL GASOLINE MANUFACTURER

EXPORT TERMINALS:
Goodhope, La. Corpus Christi, Tex.
Ingleside, Tex. Texas City, Texas

TULSA, OKLAHOMA
NATIONAL BANK OF TULSA BUILDING
PHONE 5-1101 — L.D. 358 WIRE — OR WRITE P. O. BOX 1559
Cable Address: STAVOLENE, Tulsa, U. S. A.

FOREIGN REPRESENTATIVES:
Banks, Williams & Co., Ltd.
4 Lloyd's Ave.
London, England

the OIL AND GAS JOURNAL

Trends

Crude-Oil Production
By States—Page 102

CRUDE-OIL STOCKS 220,331,000 bbl. as of January 6—down 2,667,000 bbl. One year ago 238,114,000 bbl.

GASOLINE STOCKS 86,616,000 bbl. as of January 6—up 2,000 bbl. One year ago 76,924,000 bbl.

RESIDUAL FUEL-OIL STOCKS 56,074,000 bbl. as of January 6—down 1,356,000 bbl. One year ago 54,570,000 bbl.

GAS OIL AND DISTILLATE STOCKS 38,298,000 bbl. as of January 6—down 1,197,000 bbl. One year ago 41,004,000 bbl.

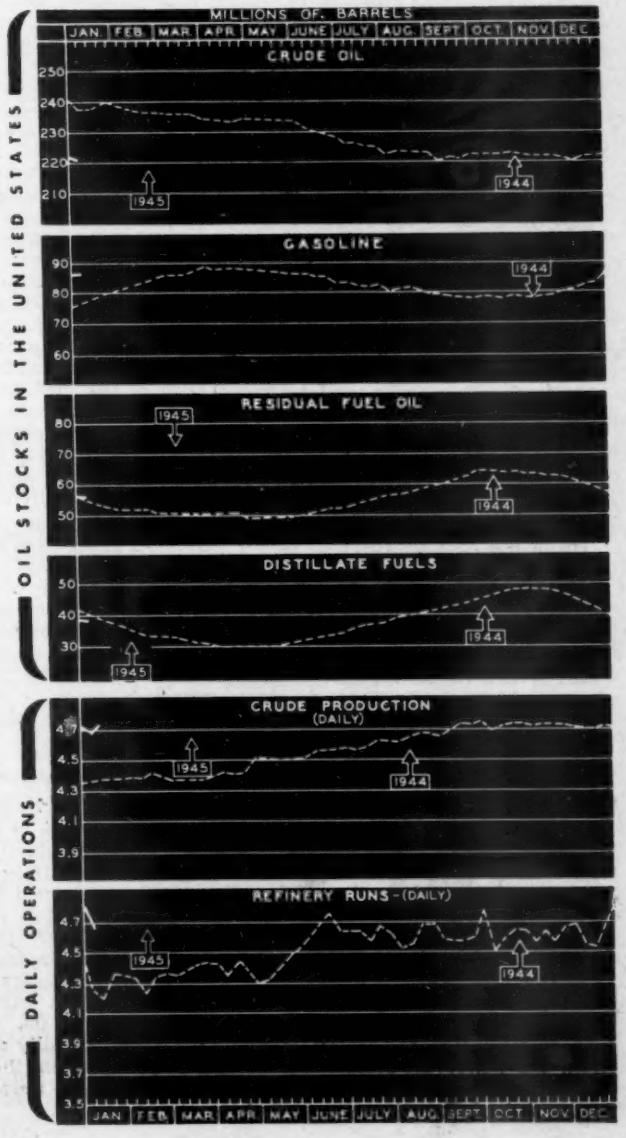
CRUDE OIL PRODUCTION 4,718,600 bbl. as of January 13—up 41,250 bbl. One year ago 4,374,655 bbl.

REFINERY RUNS 4,656,000 bbl. daily week ended January 6—down 142,000 bbl. One year ago 4,226,000 bbl.

IN CONNECTION with the Washington plans announced in part this week, to expand petroleum operations, many operators in this country have expressed surprise at the part Canada will have in the program. This situation is not new to military and war-agency officials, who from the start have considered United States and Canada as a unit in their petroleum planning. It is not realized by some that in the production of many war materials Canada ranks next to this country, with civilian requirements exceeding those of Great Britain and second only to this country. In regard to supplies there is the additional fact that the production of liquid petroleum in the Dominion accounts for about 15 per cent of the military and civilian requirements.

IN PETROLEUM planning Canada naturally divides itself into four areas. In the inland area is the production of the province of Alberta, amounting now to about 23,500 bbl. daily or 83 per cent of the entire Dominion. This production, which is decreasing in volume, is the principal source of supply for 14 refineries located in Alberta, Manitoba and Saskatchewan, with a rated crude-oil capacity of 43,300 bbl. daily. Very little war output is involved, a large part of the production being absorbed in important agricultural activities. North of this area is the Northwest Territory in which is located the completed Canol project. The crude-oil production according to the latest report (October) now totals 4,355 bbl. daily, which supports a military operation including Alaska centering in a refinery at Whitehorse, in the western part of the territory. On the west coast, in British Columbia, there are four refineries, with a crude-oil capacity of 25,700 bbl. daily. These plants in prewar days obtained the bulk of their crude oil from California.

THE MOST important operation, both from war and civilian standpoints, is located in the eastern part of Canada. There are 12 refineries in Nova Scotia, Ontario and Quebec, with a rated crude-oil capacity 193,900 bbl. daily. Several of these refineries are war-production plants, and all support civilian activities from which most of Canada's war production comes. Except for a crude-oil production of less than 500 bbl. daily in Ontario and New Brunswick, all the charging stock for these refineries is imported.



War Developments Create Tighter Transportation Situation

by Henry D. Ralph

WASHINGTON. — A much tighter situation in petroleum transportation, particularly as regards District 1, is in prospect during the next few months, it is apparent from various official sources.

War developments recently necessitated the transfer of military use of some of the few remaining tankers moving oil from the Gulf to the East Coast, it is stated in the year-end report of the House petroleum subcommittee.

An even further diversion of tankers from the East Coast run was forecast last week in the first quarterly report of James F. Brynes, director of War Mobilization and Reconversion, which said: "Developments of the last month indicate that a number of tankers now in service may have to be recalled for overseas military operations. Since pipe lines have been operating at capacity, this means that railroads may have to resume a major portion of the East Coast petroleum transport."

The Byrnes report said that in the middle of 1943 railroads were carrying 71 per cent of the oil moving to the East Coast, and tankers only 8 per cent.

"Last year, however, new pipe lines were in operation and moved 38.7 per cent of East Coast petroleum and petroleum products; tankers returned to transport 16.1 per cent of the volume. The load on the railroads dropped to 37.8 per cent of the total."

Recent developments in the tank-car situation, however, indicate that the railroads may not be able to return to their former high movements of petroleum to the East. A great many tank cars have been diverted from the East Coast run for various purposes and probably cannot be put back into this service. Many are being used to move petroleum war products from the Mid-Continent and southwest areas to the Pacific Coast, a movement now amounting to some 130,000 bbl. per day. Others are being used in shuttling 100-octane components among refineries, while others have been put back into short-haul service to replace trucks laid up for lack of tires.

Very recently a considerable number of tank cars have been taken from the petroleum service for reconversion to carry sulfuric acid because of the large expansion in acid production facilities required by the Army for the new explosives program. This reconditioning work has tied up repair shops to such an extent that there are now between 4,000 and 5,000 bad-order tank cars out of service.

Officials of the Office of Defense Transportation estimate that there is a shortage of 6,000 tank cars for the East Coast petroleum service, indicating a deficit of 75,000 bbl. per day in supplies as compared with rationed demand this spring.

Transportation facilities for petroleum into District 1 will come as near failing this spring as at any time since the outbreak of the war, in the opinion of some officials.

One step toward remedying the situation was the recent order of Interstate Commerce Commission drastically increasing the demurrage charges on tank cars held for loading or unloading. Some changes in this order may be made as a result of a conference this week between shippers and ODT officials, but the main features of the order are expected to be retained. Some modifications may be made for cars which must be detained an unusually long time, such as those carrying compressed gases, commodities which must be heated for long periods before unloading, and cleaning cars to handle a different commodity.

All railroads are being asked to develop a program for faster line-haul movement of tank cars, and inspectors of the ICC and the Association of American Railroads are being sent out to help speed tank-car turnaround in all industries.

In discussing the petroleum transportation situation during the past year, the House committee report stated:

Tankers

In addition to the petroleum products which must be transported to the military theaters abroad in tank ships, large quantities of crude oil must also be hauled from producing to refining centers in tankers. Although the tanker fleet is steadily increasing, increasing military requirements are such that a tight tanker situation exists. It is still necessary that the movements of tankers be carefully planned so that they will move on the shortest possible hauls and thus give a maximum of service.

It has been necessary, for this reason, to draw heavily upon the Atlantic seaboard of the United States to meet the requirements of the European theater. Similarly, every effort has been made to increase the available supplies on the West Coast, which area is the nearest source of supply for the Pacific theater.

Tank Cars

The reduction in tank cars for the East Coast movement is due to a number of factors, such as the expansion to 130,000 bbl. daily of product movements to the West Coast to supply additional military requirements in the Pacific theater; the shuttling of thousands of barrels per week of 100-octane gasoline components by refineries to destinations to be blended; and the conversion of many cars to other essential services such as the transportation of sulfuric acid, explosives, etc. It also became necessary to use tank cars to substitute for tank trucks, many of which have been laid up because of general wear and tear and lack of tires.

East Coast

The problems involved in developing overland facilities in so far as the East Coast is concerned remain critical, although the two large government-owned pipe lines have reached their full capacity with a gradual monthly increase until, for the week ending December 1, deliveries into the New York areas from the 20-in. petroleum products line averaged 223,741 bbl. per day, and for the 24-in. crude-oil line for the same period deliveries to the East Coast were 321,422 bbl. per day, a total of 545,163. Eighty-five to 90 per cent of the 20-in. line deliveries were military products.

Until the latest emergency, when ocean-going tankers were further diverted, petroleum deliveries to the eastern seaboard as a whole were being maintained, although rail deliveries fell from 729,391 bbl. a day in May 1944, to 518,400 bbl. a day in November; total pipe-line transportation increased from 655,208 to 731,727 bbl. per day in the same period. Barge and ocean-tanker transportation increased from 363,603 to 499,906 bbl. daily, so that the grand total of 1,707,059 bbl. per day for March increased to 1,748,121 bbl. a day in November.

Change in Movements

A radical change took place in transportation during the months of August, September, and the first 2 weeks of October 1944. Overland movements declined to 1,402,206 bbl. a day. This was directly attributable to reduced rail movements caused by a shift from east to west service. During this period tank

cars delivered an average of 560,396 bbl. per day, a sharp monthly decline, whereas total pipe-line movements had increased to an average of 701,795 bbl. per day.

War developments recently necessitated the transfer to military use of some of the few remaining tankers moving oil from the Gulf to the East Coast. It became necessary to assure a supply of petroleum products by overland facilities to meet the rationed civilian demand, particularly on the eastern seaboard. The Petroleum Administration increased tank-car shipments into this district by transfer from other parts of the country and by shortening the length of the tank-car hauls wherever feasible.

At the height of crude oil movements by tank car there were more than 70,000 cars assigned to the eastern seaboard. In the middle of December 1944, there were only about 48,000 cars moving to the east. The Petroleum Administration set about to increase this movement as rapidly as necessary adjustments permitted.

For the week ending December 9, the average daily deliveries by all means of transportation into the eastern seaboard were 1,768,534 bbl. per day.

It was necessary to withdraw cars from petroleum service and convert them to provide liquefied-petroleum-gas transportation. These gases are utilized in the greatly expanded aviation-gasoline program.

This reduction in the petroleum tank-car fleet has been inescapable. New cars constructed up to the capacity of the tank-car building shops, over and beyond the specialty cars mentioned, have been mainly for the Army and for overseas service.

It is estimated there are now over 5,000 tank cars in the repair shops as contrasted with 3,000 a year and a half ago. This increase in bad-order cars results from their increasing age in service and the long haul and high speeds to which they have been subjected.

The problem has been more complex and broken down into detail such as commodity situations, shifting of origin and destination points, equipment shortages and repair and upkeep complications. Over-all problems of recent months have been to increase movements to the West Coast and crude oil from West Texas to the Midwest refineries.

The tank-car movements to the West Coast have become of great importance and will grow in the next few months to much larger proportions. During the first 6 months of 1944, tank cars moved to the West Coast 7,771,014 bbl. of petroleum. The Pacific railroads adjusted to this additional strain by constructing loading and unloading racks, railroad sidings, and expanding storage facilities. The construction and maintenance of all forms of petroleum transportation at the high level required in the face of losses of equipment and the comparatively small amount of new equipment available at the beginning of the emergency has been one of the most outstanding performances of the war.

PAW Makes Upward Revision Of Its Production Program

WASHINGTON.—Recent increases in military demands for 100-octane aviation gasoline have caused Petroleum Administration for War to make drastic upward revision in its production program and a number of large new refining facilities may be scheduled in the near future.

Up to the present all military demands for aviation fuel have been met and the old construction program is now more than 95 per cent complete, but new Army and Navy schedules for later this year and 1946 are considerably above production capacity.

The first step to meet this revision was to divert butylenes from the synthetic-rubber program sufficient to produce 10,000 bbl. per day of aviation gasoline. Adequate alcohol supplies are available to prevent any reduction in rubber output.

A program for removing bottlenecks at existing refineries is already in process, and all producers are being asked for plans to increase production by changes in methods or plant layout or by minor construction or small additions.

New construction must be resorted to if the new demands are to be met, and PAW has already approved three large new units—catalytic crackers for Standard Oil Co. of Indiana at Whiting, and Shell Oil Co., Inc. at Houston, and an alkylation unit for Shell.

War Production Board has given tentative approval for construction of other large 100-octane plants, chiefly catalytic crackers and alkylation units, provided locations can be found where manpower is available for construction. PAW is now making a survey of refining centers to check on manpower and hopes to have necessary data available shortly.

PIWC Told Materials Will Grow Even Tighter

WASHINGTON. — The increased war-production program will make it extremely difficult for the petroleum industry to obtain all supplies and equipment needed to complete scheduled operations, Claude P. Parsons, director of materials of Petroleum Administration for War, told the production committee of the Petroleum Industry War Council this week.

The military program will make use of plant facilities of the type needed for petroleum equipment at the same time that both foreign and domestic oil programs are increasing and all manufacturers are facing manpower shortages, he pointed out. The increased drilling program may run into serious difficulties through a shortage of tubular goods which may develop within a few months, since facilities are being scheduled for production of bombs, shells and rockets. Present outlook is that during the second quarter materials will be available to drill only about half the wells scheduled, he said, although efforts are now being made to correct this.

Materials probably will be available for 100-octane refinery-construction projects which are rated absolutely essential to the war program, but War Production Board is no longer approving border-line construction projects which only indirectly affect production of petroleum war products.

F. W. Floyd Made Head of Phillips in Venezuela

F. W. Floyd who has been an official and technical co-ordinator of the Creole Petroleum Corp. with headquarters in Venezuela for the past several years has resigned his position to take charge of the newly established office of the Phillips Petroleum Co. in Venezuela. His headquarters are in Caracas.

The Phillips company recently acquired large concessions in Venezuela and has completed plans to carry on an extensive exploratory and development program in that country. The Caracas office will also have charge of the company's operations in Colombia.

Floyd is widely known in the Mid-Continent area due to his long association with the Carter Oil Co. He was vice president of the company when he was transferred to Venezuela.

Price Committee Seeks to Base Ceilings on Replacement Costs

WASHINGTON. — The possibility of obtaining an increase in crude-oil prices by basing ceilings on replacement costs rather than historical costs was explored by the industry advisory committee of the Office of Price Administration meeting here this week.

Committee elected Charles F. Rooser, Fort Worth, chairman, and Carl E. Reistle, Houston, vice chairman, and appointed Russell Brown and James V. Brown of the Independent Petroleum Association of America as counsel and secretary-treasurer, respectively.

A subcommittee was appointed to study the cost-survey plan proposed by OPA which was to report back later in the week, but much dissatisfaction was expressed with the proposal to obtain former discovery costs from the books of producers, since it was pointed out that most small operators cannot show this figure accurately. Use of an arbitrary flat figure was suggested, such as the 60 cents per barrel used by OPA in figuring the subsidy for high-cost wells, but a considerably lower figure would have to be used for the average of the industry. Estimates of historical finding costs range from 22 cents to upwards of 60 cents per barrel. OPA officials expressed willingness to use a flat figure if one can be determined to be factually accurate, and this matter is still under study.

Entirely New Approach

Chief discussion at the January 15 and 16 meetings was over present and future discovery costs. OPA has always fixed price ceilings on basis of industry earnings, and the committee admitted that on this basis it cannot make out a case for hardship under present ceilings.

However, the committee asked OPA to take an entirely new approach and fix oil ceilings on the basis of a long-range conservation program which would permit exploration and development to insure future oil supplies. OPA appeared willing to consider this provided sufficient factual data can be developed to support use of this new principle in raising the ceiling on a commodity which would increase the cost of living. OPA would not have the power to raise the ceiling on such a basis but would have to appeal to the Office of Economic Stabilization for authority.

Difficulties of ascertaining present replacement cost of oil became apparent early in the meeting and threatened to bog down the proceedings. Committee members admitted the industry can't say how much oil will be discovered next year as a result of expenditures, nor even how much was discovered last year because A.P.I. figures show small reserves for each wildcat and extensions may be added years later. OPA cautioned against taking a high arbitrary figure for discovery costs and present operating costs on the ground this might endanger the 27½ per cent depletion allowance in the tax laws.

While the full committee continued its discussion of replacement costs, a subcommittee was working on the OPA plan for survey of historical costs. This consisted of E. P. Potter, chairman, A. C. Rubel, Merle Becker, J. P. Coleman, W. B. Emery, and Carl E. Reistle, Jr. Tentative plans were for the subcommittee to make a preliminary report this week and probably meet later in the middle west. OPA officials indicated they would agree to any reasonable method of cost ascertainment developed by the industry and then would try to justify the results with director Fred M. Vinson of OES.

Permanent Subsidy Favored for Strippers

FORT WORTH.—Decision was reached here last week at a meeting of the National Stripper Well Association directors and state vice presidents to seek legislation for a permanent subsidy covering high-cost, stripper-well production.

Howard J. Whitehill, Tulsa, president of the N.S.W.A., pointed out the stripper well industry was not static, that as flush production fades, leases quickly become stripper producers. Thus as oil in old producers is completely exhausted and abandoned there are continual additions both to the ranks of stripper wells and stripper-well owners and producers.

Charles F. Roeser, past president of the Independent Petroleum Association of America, pointed out that stripper production cannot be maintained in competition with flush production. He predicted that the price of crude oil never again would rise higher than $2.25 a barrel.

"At this price," Roeser asserted, "crude petroleum comes into competition with oil shales.

"Therefore, stripper oil production will need protection against price fluctuations that will carry below the point of profitable operation of these wells.

"Are these wells vital to the national economy?" Answering his own question, he said stripper wells produced more than 500,000 bbl. of oil daily and included approximately 4 billion barrels of the nation's total estimated reserves of 20 billion barrels of crude oil.

The association will seek to tie its demand for permanent payment legislation into the OPA oil-production cost survey.

Pfister Appointed Chief of Production Research

OIL CITY, Pa.—Dr. Rudolf J. Pfister, assistant professor of petroleum and natural-gas engineering at Pennsylvania State College, has been engaged as chief of oil-production research in a laboratory being established in Bradford by Pennsylvania Grade Crude Oil Association. He also will act as general consultant on problems involving secondary recovery and he will move to Bradford.

Dr. Pfister, whose work at Pennsylvania State has been in its Mineral Industries Experiment Station, has attracted wide interest among oil men in a water-input profile experiment at Columbia Hill, Rixford, near Bradford.

Selection of Dr. Pfister, who will be associated with Richard V. Hughes, director of production research, and J. P. Jones, director of production, represents another step in the $300,000 3-year research program established by the Penn Grade organization, D. T. Andrus, president, said. The association will provide $150,000, the rest to come from industry. The objective is to discover new methods to recover an estimated 6 billion bbl. of Pennsylvania crude oil not obtainable by current operations.

Dr. Pfister received an A. B. degree at Butler University in 1932, and an M. A. from Oberlin College in 1936. He was awarded the Ph. D. by Pennsylvania State in 1942.

Maloney Dies, Leaving Oil Committee Chair Unfilled

WASHINGTON.—Sen. Francis C. Maloney of Connecticut died January 16, leaving the chairmanship open on the Senate special petroleum resources committee. Formal hearings scheduled by the committee to investigate domestic petroleum resources and those in foreign countries were postponed last fall pending completion of the Anglo-American pact discussions.

THIS WEEK

TRANSPORTATION—Gloomy prophecy is that facilities for moving oil to Atlantic seaboard will come as near failing as at any time since outbreak of war. . . . ODT estimates shortage of 6,000 tank cars for East Coast service. . . . Indicates supplies 75,000 bbl. below daily rationed demand. . . . Further diversion of tankers from East Coast run forecast by Byrnes. . . . Railroads may not be able to resume former high movements to the East. . . . Expansion of products shipment to West Coast for Pacific war operations to 130,000 bbl. daily is important factor in difficult situation. . . . ¶ICC revises demurrage order, which caused storm of protests among refiners, natural-gasoline manufacturers. . . . New order imposes heavy charges only on tank cars for unloading.

PROGRESS—C. B. Veal, Coordinating Research Council, says dreams of postwar gasoline that will drive car 30 to 50 miles on a gallon, can't come true. . . . All right for airplanes, but no good for automobiles. . . . More good things to look forward to in lubricants than in motor fuel. . . . ¶"Chemical cocktails," worth some $20,000,000, vastly heightening value of lubes, now being used annually. . . . ¶Russian scientist announces certain oil fractions, especially asphalt, offer important source of vanadium. . . .

INTERNATIONAL—Anglo-American pact withdrawn from Senate for revision and further negotiations with British. . . . President says pact needed, but causes of misunderstanding must be removed. . . . ¶Mexico boosts annual oil budget $8,200,000. . . . Plans increase in crude output of 10,000,000 bbl. . . . Payments to be made on expropriation debt to United States, but no agreement reached with British. . . . ¶Standard of California acquires oil concessions in Venezuela totaling 1,000,000 acres. . . . Its concessions in that country now aggregate 4,300 square miles. . . .

MATERIALS—Ickes warns that various equipment items becoming critical. . . . New drilling program calls for 2,014,000 tons of carbon and alloy steel. . . . About 16 per cent more than estimated requirements for 1944. . . . Expect to spend $208,000,000 in 1945 for refinery, natural-gasoline and cycling units, demanding 20 per cent more materials than were used last year. . . .

PRODUCTION—PAW makes sharp upward revision of 1945 scheduled refinery output to meet unforeseen military demands. . . . Original plant construction program 95 per cent complete, but new Army and Navy needs are above productive capacity. . . . ¶Nation's daily oil output 4,718,600 bbl. . . . Increase of 41,250 over previous week. . . . Kansas up, Illinois down. . . . ¶Applications for high-cost-production subsidies received from 178 pools by OPA. . . . Oklahoma leads with 45. Kansas next, 42. . . . Only four approved thus far. . . .

DRILLING—Twenty-nine fields in Southwest, formerly "restricted areas," opened for oil wells. . . . Ohio Oil Co.'s exploratory well on Maryland's Eastern Shore abandoned after striking bedrock at 5,568 ft. . . . No oil showing. . . . Cost $250,000. . . . ¶PAW says 27,000 oil wells must be drilled in 1945 to maintain production necessitated by war demands. . . . Is 3,000 more than were completed in 1944. . . .

PRICES—Industry advisory committee seeks new basis for price ceilings. . . . Urges acceptance of replacement cost as yardstick, instead of earnings. . . .

Small, improvised motor cars, powered with gasoline engines salvaged from old automobiles, are being used by Humble Oil & Refining Co. to transport its drilling crews and other company personnel into its Bayou Des Glaise field, Iberville Parish, Louisiana Gulf Coast. The cars operate on an abandoned 8-mile stretch of railroad track extending from a road terminal to a boat landing from which point the remainder of the journey is made by water, a distance of about 8 miles. The field, located in the heart of a swamp district, is entirely isolated from roads. The abandoned railroad is on an old artificial fill, the only high ground in the area. Housing for the cars is of plywood construction. *For story on the field see Page 72*

Anglo-American Oil Pact Withdrawn From Senate

WASHINGTON. — The Anglo-American petroleum agreement has been withdrawn from the Senate for revision and further negotiations with the British in order to meet objections from the oil industry.

The request was made to the Senate by President Roosevelt in a letter on January 10, in which the President said there is need for the agreement but it would be revised to eliminate causes of misunderstanding.

The proposed revision drafted by the Petroleum Industry War Council has been studied intensively by State Department officials who have suggested a number of changes in language. These suggestions were scheduled for discussion before the PIWC and its national oil policy committee at their regular meetings here this week.

Following these discussions with PIWC, there will be a meeting of the "cabinet level" committee of government officials who composed the American delegation which drafted the original agreement, and this group is expected to recommend to the President that a revised draft be submitted to the British Government for concurrence or further negotiation.

Prior to meeting with PIWC, government officials expressed the view that there were no major obstacles to working out a form of agreement which would meet the declared objectives of the oil industry as well as of the two governments.

State Department Announcement

In announcing the withdrawal, the State Department said:

"The Department of State has consistently advocated the development of broad international understanding for the promotion of sound trade and commerce between nations as essential to the building of world-wide peace and prosperity. The Anglo-American oil agreement was concluded in an endeavor to apply this cooperative approach to particular problems and to lay the basis for the removal of possible causes of friction in the field of international oil.

"However, in view of the misunderstanding that has arisen concerning the purpose and scope of that agreement, the department has requested the President to withdraw the agreement from the Senate. The purpose of this course is to permit consideration of the best way to achieve the fundamental purposes underlying the agreement—preventing friction between nations growing out of problems of foreign oil and assuring to all an adequate supply. It appears to the department that the misunderstandings which have arisen come not from lack of agreement upon these objectives but from the implementing features attending them."

Text of the President's letter to the Senate follows:

"Pursuant to the recommendation of the Secretary of State, on August 24, 1944, I transmitted to the Senate for its advice and consent to ratification an agreement on petroleum between the governments of the United States and of the United Kingdom of Great Britain and Northern Ireland which was signed in Washington on August 8, 1944.

"At that time I considered that the agreement constituted an important step forward in removing possible causes of friction in international trade in petroleum and promoting cooperation among the nations in the development of that trade. I have not changed my opinion in this respect. However, I am informed that fears have been expressed as to the scope and effect of the document, as now worded; some voicing concern lest it authorize acts by the petroleum industry inconsistent with the provisions of existing law, others lest it hold potentialities harmful to the industry. It is my belief that these fears are without foundation. Certainly no such possibilities were intended or designed by the American representatives who negotiated the agreement.

"Since there is general accord that an understanding on international trade in petroleum between the United States and the United Kingdom is desirable and in the public interest, it would be unfortunate if this should be delayed, if not prevented, through a misunderstanding as to the purpose and scope of a particular document.

"The Secretary of State, accordingly, has recommended that I request the Senate to return the agreement in order that consideration may be given, in consultation with the Government of the United Kingdom, to whatever revision appears to be necessary to achieve its objectives and to remove grounds for misunderstanding. I, therefore, request that the agreement be returned for this purpose."

Policy Committee Considers Redraft of Pact

WASHINGTON.—A redraft of the Anglo-American oil treaty was considered by the National Oil Policy Committee of Petroleum Industry War Council Monday and Tuesday at meetings participated in by Secretary of the Interior Ickes, deputy petroleum administrator Davies and Charles B. Rayner, State Department petroleum adviser.

A new draft made by the State Department was compared with the original document and with the revision suggested by PIWC. Various pragraphs were discussed in considerable detail, and alternate proposals were taken under advisement by the government officials. The committee reconvened Tuesday afternoon with prospects of reaching agreement on virtually all matters, although some members remained doubtful of the wisdom of concluding any international oil agreement at this time. In contrast with some previous sessions of this committee, the meetings this week were said to have been marked by complete harmony and understanding between industry representatives and government officials, and it was expected that the full council would take action on the redraft before the January meeting ends.

Ickes Predicts Early Production of Synthetic Liquid Fuels

WASHINGTON. — Reporting on progress toward development of synthetic liquid fuels, Secretary of the Interior Harold L. Ickes predicted that production of about 100 bbl. daily would begin this fall.

The site of the experimental plant, authorized under the Synthetic Liquid Fuels Act, has not been chosen, but various sites in Colorado and elsewhere are being investigated, Ickes said, and negotiations for needed equipment are under way.

Continental Oil May Buy Navarro Company

Negotiations involving the purchase of the Navarro Oil Co. with headquarters in Houston by the Continental Oil Co. were reported under way the first of the week. The Navarro company which was organized in 1922 by the Farish interests has production and royalty located principally in Texas, Louisiana, Arkansas and Oklahoma with a net output of approximately 6,000 bbl. daily.

The Navarro company has no indebtedness. There were 348,918 shares of common stock outstanding at the start of 1944. The stock was recently quoted on the New York Curb at $45 a share. S. P. Farish is president of the company and V. A. Brill, vice president.

Higher Demurrage Charge Is Applied to Unloading Only

WASHINGTON.—Revised Service Order 263 issued by the Interstate Commerce Commission January 13 imposes heavy demurrage charges only on loaded tank cars held for unloading, modifying the previous order which would have applied to all tank cars as of January 15.

The new order is effective 7 a.m. January 22 and expires April 1 unless further extended. Free time is reduced to 24 hours where it is now 48 hours, and to 96 hours where it is in excess of that for transfer into tanker or barge. Sundays and legal holidays are included in counting time of detention. Demurrage for detention beyond free time is $11 per day or fraction for first 5 days and $22 per day after that. All rules providing charges for storage in lieu of demurrage are suspended. Where railroads now permit additional free time for weather conditions, bunching and other similar disabilities, such additional time shall be added to the reduced free time provided in the new order; this was one of the chief requests of the tank car advisory committee which met with the Office of Defense Transportation last week.

The new order applies throughout the country to tank cars in intrastate, foreign, and interstate commerce.

Coleman Resigns as PAW Program Director

Stewart P. Coleman, director of the program division, Petroleum Administration for War, has resigned and will return to his post as director of the department of economics of the Standard Oil Co. (New Jersey) from which he had taken a leave of absence.

Howard W. Page, New York, formerly assistant director, succeeds Coleman. In addition to his duties as division director, Page will have immediate supervision of the domestic programing work. Jerry Cogan, New York, formerly an assistant director, becomes associate director of the division. He will be in charge of programing petroleum supplies for foreign areas.

Coleman joined the PAW staff in June 1943 as the first director of the newly established program division. He was responsible for coordinating the domestic and foreign oil-supply programs. He was PAW representative at the world program conference at which were also represented the Army, Navy, War Shipping Administration and shipping and petroleum agencies of the British Government. It was the responsibility of these agencies to review and project the petroleum war needs of the United Nations.

Page has been on the PAW staff for 2 years. Previously, he was a member of the staff of the PIWC working subcommittee on petroleum economics. A graduate in chemical engineering from Stanford University, he did postgraduate work at the Massachusetts Institute of Technology. He has been connected with the oil industry since 1929, when he went to work for the Humble Oil Co. In 1933 he joined the staff of the Standard Oil Co. (N.J.), serving for 7 years as the company's assistant manager of European refining activities with offices in Paris and London.

"Restricted Areas" May Now Be Drilled for Oil

HOUSTON. — Twenty-nine fields in Texas, Louisiana and Arkansas, in what heretofore have been designated "restricted areas," may now be drilled for oil, provided each well complies with Supplementary Order 12, issued July 1, 1944.

In issuing the new order W. M. Averill, director-in-charge of District 3, Petroleum Administration for War, says: "If any well authorized hereby is completed as a gas or condensate well, it shall not be produced except to provide fuel for drilling or fuel for other lease operations, or for testing the well for a period not exceeding 15 days, until authorization has been granted by PAW. Before an application for authorization to produce such wells will be favorably considered, the questions of material requirements, gas demand and utilization, and consolidation of appropriate acreage must be satisfied."

Fields affected by the order follow: East Central Texas—Cayuga, Hawkins, Long Lake, Rodessa. Texas Upper Gulf Coast—Dickinson (not including Gillock field), Eureka Heights, Hamman, Red Fish Reef, Willow Slough. South Texas—Alice, Ben Bolt, LaRosa, McLean, N. Magnolia City, North Sweden (Benavides), Sejita, Shield. South Louisiana—Delta Farms, Erath, Gibson, Lake Arthur (South Roanoke), Lake Long, West Gueydan. North Louisiana—Cotton Valley, Lisbon, Rodessa, Sligo, Sugar Creek. Arkansas—Rodessa.

Index Ready Soon

The complete editorial index of The Oil and Gas Journal for 1944 will be ready soon, but, conforming to practice in previous war years, it will not be published in a regular issue. The 1944 index, bound separately, will be sent without charge to all subscribers requesting a copy. Address requests to Circulation Department, P. O. Box 1260, Tulsa.

Pressure Maintenance Discussed Before A.I.M.E.

A forum on pressure maintenance featured the monthly meeting of the Mid-Continent section of the A.I.M.E. last week in Tulsa. A group of six petroleum engineeers associated with different prominent pressure-maintenance programs each presented reservoir and operating features for one or more projects. After the meeting the subjects were opened to a round-table discussion where various questions from the audience were further discussed.

The speakers were: R. W. French, Continental Oil Co., Ponca City, Okla.; C. C. Rae, Skelly Oil Co., Tulsa, Okla.; W. L. Horner, Barnsdall Oil Co., Tulsa; Ed. Burtchaell, Stanolind Oil and Gas Co., Tulsa; H. H. Kaveler, Phillips Petroleum Co., Bartlesville; and John Mullane, Carter Oil Co., Tulsa. Lloyd Elkins, Stanolind Oil & Gas Co., Tulsa, was program chairman.

Stanley Wilcox, Seismograph Service Corp., Tulsa, is chairman of the Mid-Continent group. The meeting was attended by approximately 150 from Tulsa, Oklahoma City, Ponca City, Bartlesville, and Nowata.

Wyoming Urged to Join Compact States

CASPER.—The reorganized Rocky Mountain Oil & Gas Association at its meeting here last week went on record in favor of Wyoming joining the Interstate Oil Compact Commission with certain reservations. The vote was 11 to 6. A committee was named to put the proposal in acceptable form before submitting it to the state legislature for approval.

Critical Situation Confronts Nation's Producing Operations

WASHINGTON. — The extremely serious situation which will confront the oil industry during the next 6 months as a result of the recent stepup in military programs was outlined to the Petroleum Industry War Council this week in the monthly report of the production division of Petroleum Administration for War.

Crude production has reached maximum efficient capacity and is declining below domestic requirements, requiring an increase in imports. The programed production for the next 6 months will require domestic production somewhat in excess of maximum efficient capacity, though not enough to cause serious injury, but this demand can be met only if materials and manpower are provided to drill the programed 27,000 wells this year.

However, tentative military demands for later in the year, if made firm, will mean a crude shortage of at least 100,000 bbl. daily. Unless drilling is continued, productive capacity will continue short during 1945, and 27,000 new wells as a minimum are required to maintain capacity at present level.

Manpower Shrinkage Threatened

However, the drilling program is seriously threatened by the increase in Army and Navy inductions and steps being planned to meet the manpower shortage in war factories, and particularly by new production programs for rockets, bombs and other equipment which will use facilities needed in producing oil-industry equipment. The outlook for tubular goods for the first half year is not good. Available mill capacity for the first quarter is slightly less than the tonnage required for the drilling program, and during the second quarter it is less than half the amount needed for the number of wells scheduled. Representations are being made to War Production Board to correct this, but if the present tentative program becomes firm it will be necessary to make a drastic reduction in the drilling program or else build new tubular mill capacity.

The second quarter drilling program now before WPB calls for 6,900 wells, requiring 287,000 tons of tubular goods, whereas it appears that only 142,000 tons will be available.

Included in the report were the following November statistics: 537 geophysical and core-drill crews were active; 345 wildcat and new-pool test completions were made, of which 57 were successful—35 oil, 18 gas, and 4 condensate.

Elk Hills Program Ahead of Schedule

Production of Elk Hills oil under the unit agreement between the United States Navy and Standard Oil Co. of California is well ahead of schedule. H. D. Collier, president of Standard of California reported last week that output from the Naval Reserves now exceeds 44,000 bbl. daily and has reached two-thirds of the planned maximum. Standard of California is acting as operator in the program to increase production to 65,000 bbl. daily to provide crude supplies critically needed by California refineries for the war. Previously Elk Hills production averaged 15,000 bbl. daily.

Collier estimated this 65,000-bbl. goal would be reached substantially in advance of the June 30, 1945, deadline set by the Navy.

Since the first well authorized by the program was spudded in during June 1944, 117 wells have been completed. All of their output is from the shallow zones — approximately 3,000 ft. Average daily production is better than 200 bbl. per well.

Nineteen contract drilling strings are now working in the field. Monthly totals of well completions have been: July, 4; August, 10; September, 16; October, 27; November, 27, and December, 33.

The complete program is expected to total approximately 250 wells. Under the unit operating agreement, Standard of California is receiving 15,000 bbl. daily, with the remainder being sold by the Navy to the highest bidder.

Fuel Oil for Home Heating Still Scarce, Ickes Warns

WASHINGTON. — "For the remainder of the heating season, meeting home-heating demands will be strictly touch-and-go," says Petroleum Administrator Harold L. Ickes in a statement emphasizing that fuel-oil stocks are below last year's level and that consumers should avoid excessive use that will deplete stocks too rapidly.

"Fuel-oil supplies are tight, but adequate to meet current rationed demands," said Ickes. "However, there is not as much fuel oil available as there was 12 months ago. That means that overconsumption will make the problem more critical. Military requirements have been stepped up, placing a further burden on American refiners."

Stocks of home-heating fuel oil held at refinery and terminal storage on December 30 totaled 39,495,000 bbl., compared with 42,728,000 bbl. on December 30, 1943. This represents a decrease of more than 3,000,000 bbl., but as a result of military needs, supplies actually are tighter than the figures would indicate, Deputy Administrator Ralph K. Davies said.

Standard of California Gets Venezuelan Concessions

NEW YORK.—Richmond Exploration Co., subsidiary of Standard Oil Co. of California, has acquired a second group of oil concessions, covering about 1,000,000 acres, in Venezuela. Most of the land is in the delta region of Orinoco River, in the state of Managas. With those previously obtained, covering some 1,750,000 acres west of Lake Maracaibo, the company now has concessions totaling approximately 4,300 square miles.

"Standard of California's activities in Venezuela reflect the general increased interest in foreign sources of oil," said H. D. Collier, president. "Exploration has been stepped up because of the necessity of finding sources of petroleum to replace the vast quantities used to fight the war

THE ANNUAL NUMBER - - - Next Week . . . .

Will contain detailed forecasts on drilling, refining, production trends and other pertinent guideposts to 1945 operations in another multicolor section. Also, the Journal's annual detailed analysis of new discoveries, extensions and proven petroleum reserves by fields and states.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Start From Sound Base

DESPITE the record of the past, it can be assumed for the present that the Office of Price Administration acted in good faith in creating the National Crude Oil Industry Committee, whose 23 representative members are meeting this week in Washington with OPA officials. The war agency says that it wants advice from the oil industry as to cost methods as a basis for determining whether crude-oil price schedules should be advanced from present levels.

It has been asked: "What chance have we of getting better prices for crude oil in the light of the high earnings of the big oil companies?" This query is postulated on a condition which does not exist. It is true, as many financial writers have explained without going further that the earnings of the major oil companies showed a larger percentage gain in 1944 than the operating units of most industries.

The truth is that the returns of these larger units are still under the average of all industry and substantially less than most enterprises which are comparable in point of capital risks involved. Since World War I there have been only a few periods and these of brief duration in which profits of oil operators whose stocks are quoted on the major exchanges, have approached the levels of other large and small industrial companies.

In the current situation it is also necessary to keep in mind that oil operations covered in financial comparisons are for the most part integrated. Margins of the refining and marketing divisions over the past 2 years have been greater than normal and in many instances are entirely responsible for increased earnings. Profits from these other divisions are reasonable, but should be segregated in arriving at crude-oil cost data.

If past practices of government bureaus and legislative investigators are followed in a new investigation, OPA will insist that price ceilings for 1945 be based on what it cost to produce 1,670,000,000 bbl. of crude last year. The weaknesses of that approach were never more apparent than they are now. A fairer criterion would be the cost of finding and producing a comparable quantity of entirely new oil. Actually, in normal times, with a free interplay of competitive conditions, crude-oil prices are determined by a combination of the two operating forces. The main test as pointed out by committee members is not what happened in the past but whether the price will maintain a balance between new discoveries and new demands.

Additional reserves from new fields did not offset 1944 production. The rate of new discoveries has been less than field output for several years, a condition which is reflected in a constantly decreasing index relationship between reserves and annual production. No government investigators nor any group from within the industry can determine exactly the price incentive required, but it is apparent that it is above present prewar levels.

Outstanding over the past year has been the effect of maintaining output in many fields in excess of their efficient and economic rates of production. This has resulted in low per-barrel operating expenditures and temporary profits, but they are no gage of long-range costs.

Other factors in wartime operating conditions could be noted. The inevitable conclusions of all studies is that any new survey of costs must start from a new and sound basis. When that is done, there will be no question as to the action taken as regards future crude-oil prices.

Automotive Engineers Dedicated To Maximum Effort for Victory

by Arch L. Foster

DETROIT.—The Society of Automotive Engineers was rededicated to every possible effort to insure victory at the earliest practicable date by its incoming president, J. M. Crawford, at the annual meeting here last week. Crawford, chief engineer of the Chevrolet Division of General Motors Corp., will head the greatly extended activities of the automotive engineers for 1945, succeding W. S. James, retiring president and chief engineer of Studebaker Corp. Twenty-five hundred engineers made the trip to Detroit to make new plans for the coming year, and they represent the 10,000 members of the society here and abroad.

Creative thinking must be at least 3 years ahead of that of our enemies, the assembled engineers were told by Brig. Gen. F. O. Carroll, chief of the engineering division of Air Technical Service Command, speaking before the society's annual banquet. Three years is the approximate time lag between the development of specifications for a given product and the first production model, the general said. Illustrating this principle he told of the conception of the principle of the B-29 Superfortress in 1939 and of the large number of obstacles which had to be overcome in perfecting this great ship. "Our very existence," said the general, "depends on outthinking our enemies in the research field."

The requirements of a highly motorized Army and Navy have accentuated research effort in all types of lubricants. The term "Universal Gear Lubricant" is a statement of an objective, said P. V. Keyser, Socony-Vacuum Oil Co., Inc. Such a lubricant must lubricate satisfactorily automotive and truck hypoid gears and must also be reasonably satisfactory for other gears and transmissions found on these vehicles. Concerning more recent developments Keyser said:

"The CRC in cooperation with the Army have developed two service evaluation tests which appear, on the basis of very extensive data, to give, when considered jointly, a good measure of the dual speed, pressure function.

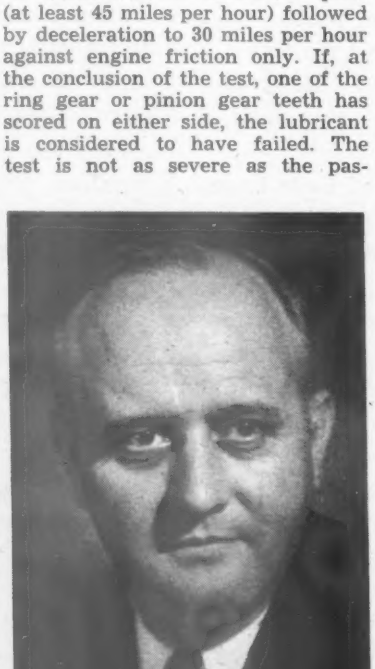
"The first of these emphasizing the speed factor is the modified shock test which utilizes 1½ ton, 4 by 4 Army truck, loaded to 100 per cent over the rated load, driven 50 miles under a repeated schedule of acceleration to maximum speed (at least 45 miles per hour) followed by deceleration to 30 miles per hour against engine friction only. If, at the conclusion of the test, one of the ring gear or pinion gear teeth has scored on either side, the lubricant is considered to have failed. The test is not as severe as the passenger car shock test included in U.S. Army Specification 2-105, but is considered to represent the most severe conditions to which Army equipment will be subjected. Obviously, if in postwar days the demands of passenger vehicles are inadequately covered by this procedure, the severity of the procedure itself can be increased or some similar procedure developed.

"The second of these tests emphasizing the pressure factor, the high torque dynamometer test, is essentially a four-square procedure with a new Dodge ¾-ton 9⅝-in. hypoid rear axle carrier, 5.83:1 ratio, operated cyclically with respect to temperature which is controlled at 200° to 250° F. over a period of approximately 30 hours, with a test load of 32,311 lb. in. ring gear torque at a speed of 62 r.p.m.

"It is perhaps fortuitous that the high torque test is also an excellent measure of the tendency of the lubricant to cause sludge or gummy deposits and metal discoloration or corrosion (true chemical attack not low temperature moisture corrosion).

"Unfortunately no laboratory oxidation or heating test investigated to date has shown any real promise of adequate correlation. Practically all of the standard tests and variations of some have been investigated."

J. M. Crawford, newly elected president of Society of Automotive Engineers



M. O. Tester, vice president, fuels and lubricants activity of S.A.E.

Oxidation Test Progressing

The L-4 Oxidation Engine Test described by B. E. Sibley, Continental Oil Co., who is leader of the CRC (Coordinating Research Council) oxidation-test group, has been improved along several lines, Sibley stated. A new crankshaft has been adopted, a new and improved, heavier copper-lead bearing liner chosen, stronger connecting rods which are more rigid than the older type formerly used is now standard equipment in the test engines. The bearing liners are now dowelled into position. Thus the bearings can be weighed after the break-in period and then returned to exactly the same position for the test run and are then weighed after the run to determine the bearing-weight loss only during the actual test run under standardized conditions. Formerly the bearings were weighed before break-in running, were broken in and then the test was made, weighing the bearings afterward. This showed the weight loss for both the break-in period and the test itself, a source of error which is now eliminated.

Piston Varnish Classified

H. C. Mougey, veteran authority on fuels and lubricants, has classified piston varnish as formed under three different temperature conditions; low temperature sludges are caused mainly by water in the

crankcase. Intermediate temperature sludge is caused by the fuel, in some measure by the oil, and varnish may be serious under these conditions, although seldom found at low temperatures. High temperature sludges are traceable to the oil's properties, and varnish may also be quite serious, Mougey says. He mentioned one case where a gasoline caused bad varnish on pistons at intermediate temperatures; the same fuel with a high quality heavy-duty oil gave good results at high temperatures. For heavy-duty oils which are near the borderline for passing U.S. Army Specification 2-104B the determining factor may be the type of gasoline used in the L-4 test.

Prevention of Oil Foaming

The foam inhibitors now used in lubricating oils, especially for military vehicles, has the rare quality of preventing foaming with its attendant or possible disadvantages, and at the same time does not affect the functions of the other additives used in the same oils, H. A. Ambrose and C. E. Trautman, Gulf Research & Development Co., stated in reporting on developments in that field. Foaming of oils has become a serious matter only in recent years, they said. In 1942 foaming became serious in certain aircraft engines, naval diesels, and in the engines and gears of tanks, so that a group to study this problem was appointed in March 1943. This group has developed a laboratory procedure by which the foaming characteristics of oils can be foretold with fair accuracy and reproducibility. Antifoam agents have been developed and are available in any required quantities to military and industrial users. It has been found that foaming tendencies of oils are promoted by oxidation; an oil under oxidizing conditions increases its foaming, while the same oil under the same conditions but containing a small percentage of antifoam agent will continue to show no foam formation even in the Underwood test at 325° F. Not all antifoam agents are persistent under severe conditions, Ambrose stated. No exact explanation of foaming and its prevention is established, Ambrose said. The action seems to be entirely physical and it is hoped that a solution may be found eventually.

Detonation Indicators

The extreme importance for detonation indicators in aircraft engines is widely recognized, and electronic equipment is available in numbers sufficient to promote engine testing in this manner, reported John W. Streett of Wright Aeronautical Corp. Detonation detection by observing exhaust flames is inaccurate, he indicated and the use of that plan delays development work and requires more extensive training of personnel. The electronic detonation detector also discovers mechanical malfunctioning in engine cylinders and thus aids in another way in development work.

The equipment now used for detonation detection was developed mainly under the direction of Dr. C. S. Draper at Massachusetts Institute of Technology under a cooperative arrangement. The first production of these units was in 1942. The work required 30,000 manhours and 15,000 engine hours of operation. By means of a vibration pickup attached to the head of the engine cylinder a neon flasher is adjusted so that with normal combustion no flash is given. With stronger vibrations set up in the cylinder by the detonation wave the flasher operates. This equipment is used now for two purposes: (1) To pick up and determine the operation limits for incipient detonation, and (2) to determine the operating limits for damaging detonation.

Few High-Cost Pools Qualify for Subsidies

WASHINGTON. — Applications have been received from 178 pools for high-cost-production subsidies, the petroleum branch of the Office of Price Administration announced last week. Most of the applying pools are concentrated in Kansas, Texas and Oklahoma.

By states, pool applications number as follows: Oklahoma, 45; Texas, 37; Kansas, 42; Arkansas, 6; Illinois, 12; California, 10; New Mexico, 10; Kentucky, 2; Louisiana, 4; Michigan, 3; Mississippi, 1; Nebraska, 2; Wyoming, 4.

Thus far, only four pools have been approved, each of them controlled by a single producer. Delays in processing applications are being caused, OPA said, by failure of a few producers in each pool to file applications. In order to speed up administrative procedure, OPA is urging all producers from applying pools to file application forms promptly, since no pools can be approved before all producer's applications are in.

OPA also reminded producers that production cost reports should be filed for calendar, not fiscal, quarters. Information is required for quarters ending December 31, March 31, June, 30, and September 30.

The four approved high-cost pools are: Hillsdale, Garfield County, Oklahoma, 35 cents; Clabberhill, Andrews County, Texas, 12 cents; Grayson, Reagan County, Texas, 13 cents, and Getty, Eddy County, New Mexico, 14 cents. Several pools have been found ineligible for high-cost producer subsidy, but were qualified under the stripper well provision.

OPA also announced the inclusion of six additional pools under the subsidy program, all effective January 1. They are: Oklahoma—St. Louis North, Pottawatomie, 35 cents; Nelagoney, Osage, 25 cents; Ball, Payne, 35 cents; Seminole, Northeast, Seminole, 25 cents; Tyrola, Seminole, 20 cents. Texas—Emperor (deep), Winkler, 25 cents.

Mexico's Oil Budget Looks To Expansion in 1945

MEXICO CITY.—Proposed crude production in 1945 is 46,254,000 bbl., compared with 36,120,000 in 1944, announces Efrain Buenrostro, manager of Petroleos Mexicanos, government oil monopoly, in presenting its budget for the current year. Expenditures totaling $87,000,000 are planned, contrasted with $78,800,000 in 1944. The budget, Buenrostro reports, provides for wildcatting, extension of distribution facilities and for payment to United States oil companies whose properties were seized in 1938.

Seventy-two new tests and 87 old wells to be reworked are the 1945 goal. Thirty exploration companies, as compared to 24 in 1944, will be sent out this year, Buenrostro said, "and the investigations will be carried on not only in proved fields, but also in regions not yet explored, in order to determine the production possibilities throughout the republic."

Almost all of Petroleos Mexicanos' production has been from fields expropriated in 1938. Most of these are dwindling, making new discoveries essential.

Payment of the expropriation debt will come from oil profits for the first time instead of from other government sources. No agreement has been reached yet for payment of expropriated British companies.

Subsidy Extended to Four Oil Fields in Illinois

MOUNT VERNON, Ill.—The stripper-well subsidy of 35 cents a barrel will be extended to four oil fields in Illinois, Chester Bowles, administrator of Office of Price Administration, has notified the stripper-well industry advisory committee here. The pools are Cisne North, in Wayne County; Raymond and Waggoner in Montgomery County, and Tamoroa in Perry County. The action will be taken by amending OPA regulation 436, to be effective December 1, 1944, as soon as published officially.

George P. Ellison, chairman of the committee, says other oil pools are being investigated by OPA.

Standard of Ohio Observes Seventy-Fifth Anniversary

CLEVELAND.—The Standard Oil Co. of Ohio celebrated its seventy-fifth anniversary January 10 with an entertainment program in Cleveland's big Public Auditorium, a 1-hour broadcast over 22 radio stations, and distribution of a 64-page pictorial history of petroleum development from 1859, the year of Drake's discovery.

The historical booklet divides the company's life into three periods—the lamp, the automobile, and the airplane. Among possibilities projected in the airplane section are "automobiles that can fly, or conversely, airplanes that can take to the road," accomplished by folding wings or detachable wings, kept at tomorrow's sky-travel parking station.

Standard of Ohio, largely a marketing organization until the thirties, when it began to expand refineries and acquire its own petroleum sources, is now an integrated company operating in Oklahoma, Illinois, Mississippi, Kentucky, Louisiana, Arkansas, Texas, Tennessee, Wyoming, Montana, Missouri, Kansas, Michigan, and intervening states. It has its own oil wells, pipe-line facilities, barge lines on the Mississippi and Ohio rivers and their tributaries, and refineries. The West Edmond oil field near Oklahoma City, largest oil discovery of recent years, requires the services of almost 700 people in drilling and allied operations. The company's goal of 80 wells in this field by New Year, 1945, was attained.

When W. T. Holliday, president since 1928, started to serve Standard in its legal department in 1908, it was just coming out of the coal-oil lamp era inaugurated by John D. Rockefeller and five associates who incorporated the original Standard Oil Co. in Cleveland, 1870.

Permission Granted to Use Gas for Channel Black

OKLAHOMA CITY.—The State Corporation Commission last week issued two "duration of war" orders granting use of natural gas in channel-process carbon-black plants. One was to Cabot Carbon Co. and the other to Charles Eneu Johnson & Co.

The first order cleared the way for Cabot to start construction of a $1,500,000 plant near Guymon, with government backing.

An appeal from J. A. Krug, chairman of War Production Board, for immediate authority to construct the plant and dispose of a petition for rehearing was presented by Floyd Green, attorney for the commission.

The commission had granted a permit for construction of the plant to operate during the war and 6 months thereafter, on gas from the Guymon-Hugoton field.

Krug pointed out that carbon black was needed for tires and he declared cables from General Eisenhower and General Somervell requested increased shipment of tires to the war front. He urged immediate rehearing on the basis of military needs.

Protests had been lodged against the application by operators in the field, on the ground that the projected plant would involve waste of gas.

The Johnson company was authorized to purchase additional natural gas from Magnolia Petroleum Co. in the Fitts field, Pontotoc County. Hearing was held last July when objection was made by producers in the field.

Under the order, the commission permits the Magnolia to sell gas from five wells to Graben Gas & Water Co. "so long as the pressure of said wells will deliver gas into the pipe line of said Graben Gas & Water Co." . . . and "when the pressure of any one of said wells is insufficient to deliver gas into said pipe line" the Johnson company is granted permission to purchase the dry gas for use in its carbon-black plant near Stonewall.

The order further specifies that the permit is issued only for the duration of the war and not to exceed 6 months thereafter.

The commission concedes that the cannel process "obtains only a small amount of carbon black from natural gas, and it is recognized as a wasteful utilization, but from the evidence it appears that there is an urgent demand for this kind of carbon black to properly prosecute the war effort."

"Management Committee" Takes Place of Board

BATON ROUGE.—Following the recent consolidation of Standard Oil Co. of Louisiana with the parent company, and its designation as Louisiana Division of Standard Oil Co. of New Jersey, M. J. Rathbone, president of New Jersey Standard, has announced a "Louisiana Division Management Committee." This committee will assume virtually the same responsibilities that formerly were vested in the board of directors.

Members of the committee, which will supervise operation of Standard's immense holdings in Louisiana, are M. W. Boyer, vice president Standard Oil Co. of New Jersey and general manager Baton Rouge refinery; T. M. Gordon, manager Louisiana marketing division; F. P. Hagaman, comptroller Louisiana Division; S. E. Kidd, assistant secretary and assistant treasurer Standard Oil Co. of New Jersey; Cecil Morgan, associate general attorney Standard Oil Co. of New Jersey; W. P. Reymond, Jr., manager employe relations Baton Rouge refinery; H. J. Voorhies, assistant general manager Baton Rouge refinery; C. H. Whitman, manager crude oil purchases for Louisiana Division.

With the exception of Whitman, who is located in Shreveport, and Gordon, whose headquarters are in New Orleans, all of the officials have offices in Baton Rouge. Boyer is chairman of the committee, Hagaman vice chairman, and Kidd secretary.

A.S.M.E. to Hear Story of Oil Industry's Evolution

R. P. Mase, chief engineer for Jones & Laughlin Steel Corp., will speak on development in oil and refinery practice in connection with a sound film, "Evolution of the Oil Industry," at the monthly meeting of the Mid-Continent section, American Society of Mechanical Engineers, Thursday evening, January 25, at the Mayo Hotel, Tulsa.

DEATHS

Abel S. Hardwicke, 71, member of Magnolia Petroleum Co.'s legal staff since 1920 and former city attorney of Dallas, died in that city January 12.

J. F. Healey, 33, chemist for Kendall Refining Co., died in Bradford, Pa., January 11. He was a graduate of St. Bonaventure College.

William Irving, 78, warehouse superintendent for Eastern States Petroleum Co., died January 12 in Houston.

Thomas V. McLaughlin, 72, retired superintendent of Otsego Gas & Oil Co., died January 9 in Senecaville, Ohio.

Frank A. Fairchild, for the past 27 years agent for United Natural Gas Co. in Meadville, Pa., died in that city January 8.

William K. Butler, purchasing agent for Kern Oil Co., Ltd., London, died recently. Butler had been with the Kern organization about 25 years and had many frields in the United States, where his company has interests.

Eugene M. Williams, 77, retired oil operator, died January 2 at Coral Gables, Fla., where he had resided 22 years. During his active oil career he operated in the Monticello, Ky., area, and he developed oil properties in Cuba and India.

J&L PERMASET PRECISIONBILT PRE-FORMED WIRE ROPE

J&L PERMASET PRECISIONBILT PRE-FORMED WIRE ROPE

PRECISION AND PRE-FORMING

MEAN PERFORMANCE FOR YOU

Like a sextant, J&L wire rope is a fine machine. It is made with *precision* and pre-formed for greater efficiency and longer resistance to wear and fatigue. Made from J & L Controlled Quality Steel . . . by men of skill and experience . . . J & L Permaset Precisionbilt Pre-Formed Wire Rope affords greater safety . . . helps keep operations at peak . . . protects your investment in equipment.

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

GILMORE WIRE ROPE DIVISION

PITTSBURGH 30, AND MUNCY, PENNSYLVANIA

J&L PERMASET PRECISIONBILT PRE-FORMED WIRE ROPE • J&L PERMASET PRECISIONBILT PRE-FORMED WIRE ROPE • J&L PERMASET PRECISIONBILT PRE-FORMED WIRE ROPE • J&L PERMASET PRECISIONBILT PRE-FORMED WIRE ROPE

J&L PERMASET PRECISIONBILT PRE-FORMED WIRE ROPE

Refining Mixtures of Kansas-West Texas Crude Oil Proves Practicable

by Arch L. Foster and R. B. Tuttle

MID-CONTINENT refiners who have been faced recently with the possibility of operating wholly or partly on sour crudes such as that from Slaughter field, West Texas, have been diligent in attempting to find out what differences in corrosion, costs, product qualities, and equipment material will exist if this change in charge stock is made. This article is a preliminary report on the experience of the National Cooperative Refinery Association plant at McPherson, Kans., with corrosion of refinery equipment over a period of about 6 months when operating chiefly on local Kansas crude with 8 per cent to about 15 per cent of Slaughter crude.

As a basis and background for the report, this McPherson plant, formerly operated by Globe Oil and Refining Co., consists of three heaters with the necessary vapor separators, towers, exchangers, condensers, treating units, storage facilities, steam generators, and other units found in practically every refinery.

In the three heaters Still No. 1 includes a gas-oil cracking section and a naphtha-reforming section, in which inlet oil and naphtha temperature ranges 640-665° F., and outlet temperatures are normally 930° to 1040° F., respectively, in the cracking and reforming coils. The corresponding pressures are respectively about 400 lb. and about 750 lb. gage. Still No. 2 is used chiefly for gas-oil and heavier cracking, shows temperatures and pressures up to 935° F. and 400 lb. respectively; also has a topped crude heater section of 64 tubes for preheating that fraction, which passes to a similar coil in Still No. 3, which latter still also has a gas oil and heavier coil operating at temperatures up to 935° F. for the cracking coil outlet and 825° F. for the final topped crude temperature.

A preliminary report on the experience of one plant which has been processing a corrosive crude mixture for about 6 months. This article explains some of the methods employed in converting existing equipment to resist corrosive action. Methods used in desalting a blend of 8-15 per cent Slaughter and 92-85 per cent Kansas crudes are described and locations of zones of high rates of corrosion are given.

Three vapor separators are employed. Into one are discharged the hot streams from the cracking (gas oil and heavier) coils in the first two stills, being quenched with topped crude immediately before entering the vapor separator. From the cracking coil of No. 3 still the hot charge enters No. 2 separator, after being quenched with charge or recycle stock, slop oil, or other available material. Outlet oil from the reformer coil of No. 1 still enters a high-pressure bubble tower at 300 p.s.i. Cracked vapors from the first two separators go to a bubble tower at 50 p.s.i., the overhead from which is raw cracked distillate cut approximately to end point, the bottoms from which, including fresh and recycle gas oils, become a portion of the cracking charge. Charge for the reformer coil, No. 1 still, is composed of various cracked and straight-run distillates up to and including No. 2 fuel-oil range, and gasoline of 400° F. end point is made for blending.

Fig. 2: Two sections of a 14-in. vapor line which was fabricated in the refinery. The sections are made of standard pipe with chrome strip lining

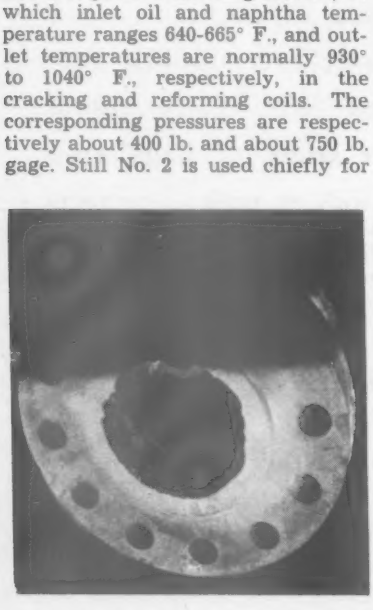


Fig. 1: Typical specimen of the eroded areas found in fittings and valves. This and other fittings are rebuilt at the refinery

The foregoing is presented to give a brief idea of the equipment involved and the main operating conditions supported by this equipment, as an introduction to further discussion of the experience had with corrosion and the steps taken before and after operating partly on sour West Texas crude to handle the situation.

Analyses of the crudes employed in this plant as charge stocks, and that of a mixture of the two, are shown in Tables 1, 2, and 3. Table 1 shows that the Kansas crude has 0.44 per cent sulfur, including 15 grams of hydrogen sulfide per barrel, along with 18.45 lb. of salt per 1000 bbl. This crude is therefore not entirely sweet and shows some corrosion when processed alone. The Slaughter crude, shown in Table 2, has 1.92

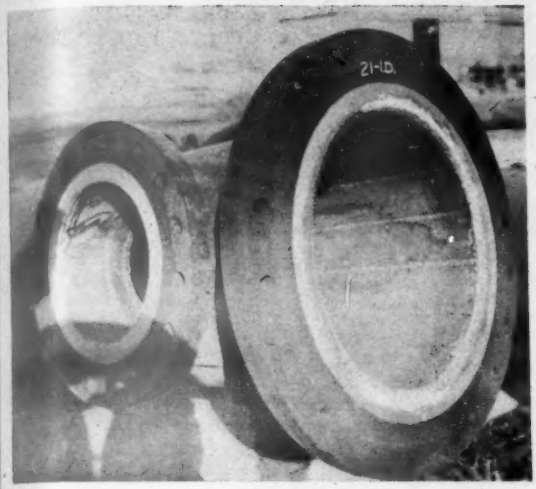


Fig. 3: A 21-in. i.d. heat-exchanger shell with chrome strip lining and corrosion-resisting gasket surfaces

per cent sulfur, free H_2S of 6.8 lb. per 1000 bbl., "potential H_2S" of 84 lb. per 1000 bbl. Its salt content is 325 lb. per 1000 bbl., free acidity of 2.7 lb. per 1000 bbl., "potential acidity" of 22.7 lb. per 1000 bbl. This crude is therefore a highly corrosive stock. It is notable that the straight-run gasoline from this stock shows 0.1844 per cent total sulfur, 95 per cent of which is mercaptan sulfur. The straight-run kerosene fraction, to 485° F. end point shows the huge content of 0.656 per cent sulfur, an entirely unpermissible amount which must be removed by sulfuric acid or other drastic treatment.

Table 3 shows the breakdown of a composite of 10 per cent of the Slaughter, Texas, crude from Table 2, and 90 per cent of the Kansas crude typified by that shown in Table 1. The composite sulfur content is 0.56 per cent; free H_2S only 0.5 lb. per 1000 bbl. Straight-run gasoline of 350° F. end point shows 0.036 per cent total sulfur, as compared to 0.034 per cent for the straight Kansas crude 410° end point gasoline. Kerosene shows 0.086 per cent S, or below 0.10 per cent; about 0.10 per cent has been found to be the approximate maximum permissible limit for S in kerosene if customer complaints are to be avoided and is the limit set in this plant's operation. Consequently when making kerosene the percentage of West Texas crude used must be below 10 per cent of the total charge to keep within this product limit of 0.10 per cent total sulfur. Experience shows that the most severe corrosion is found where prevailing temperatures are between about 650° and 750-800° F. Above and below that range corrosion rates gradually decrease. Corrosion is also lessened as the boiling-point range of the fraction increases.

Conditioning the raw crudes for processing is done as follows: The West Texas crude is stored separately in a 55,000-bbl. tank. A centrifugal motor-driven proportioning pump is located in the refinery tank farm near these storage tanks, and this pump sends the sour crude to the suction of the primary pump handling the Kansas crude input, the adjustment being metered carefully to control the percentage of sour crude added. Three per cent of alkaline water is mixed with the blended crudes, the mix is heated to 250° F. in an exchanger, passes through a tower, from the top of which the crude is taken to a settler drum, as shown in Fig. 8. In this manner 90 per cent of the contained salt is eliminated together with a considerable portion of the hydrogen sulfide. (See U.S. Pat. 2,326,882, issued 8-17-43, to W. E. Perdew). This desalted crude is withdrawn from this settler and preheated by exchanging heat with cracked vapors from the main cracking units; here the first corrosion is encountered. These exchangers are fitted now with 11-13 per cent chromium (Cr) tubes; the shell is lined with the same stainless steel (11-13 per cent Cr) alloy, welded in, in strip form as illustrated by Fig 3.

The crude is then debutanized in two towers, taking off butanes and lighter which pass to the recovery system. The crude passes to an exchanger located internally within the upper section of the vapor separator of the large cracking unit,

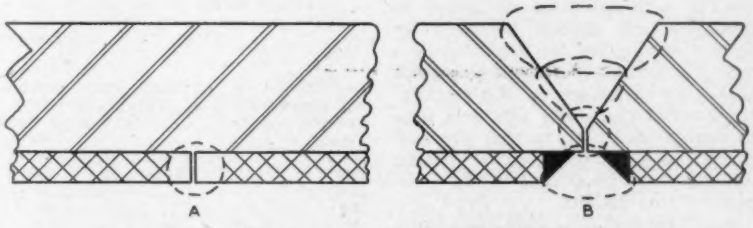


Fig. 5: Typical liner joints. "A" illustrates intermediate joints in strip liner and "B" a full joint for both liner and backing materials

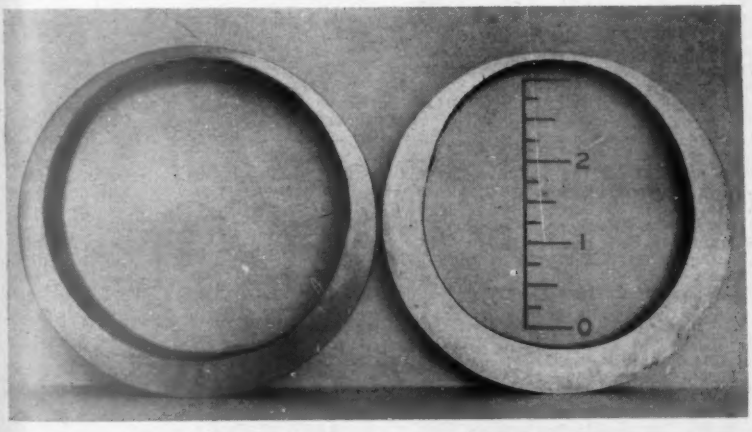


Fig. 4: Sections of 4-in. o.d. by ½-in. wall heater tubing. Section on the right taken from a tube after 6 months service on mixed crude. The other section is from a tube that operated about 18 months on straight Kansas crude

where it takes up heat from cracked vapors to reach a temperature approximately 600° F. In this exchanger baffles of 11-13 per cent are installed, with 7 per cent Cr headers and 5 per cent Cr tubes. The vapor side of the exchanger is lined with 11-13 per cent Cr strip. Here also a small amount of lime, $Ca(OH)_2$, less than 0.10 lb. per bbl. is added to the crude to neutralize any hydrochloric acid which may have formed earlier.

The crude is flashed into the straight-run tower from which a stream of gasoline to 300-325° F. end point is removed, overhead; a naphtha up to 400° F. end point, kerosene to 500° F. end point, burner oil distillate to 580° F. end point and 650° F.-end point diesel fuel are also taken as side streams; not necessarily are all these fractions taken

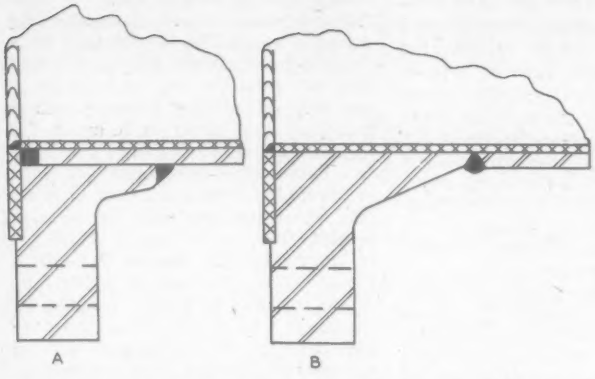


Fig. 6: Flange attachment and corrosion resisting surfaces for slip-on and butt-welding flanges

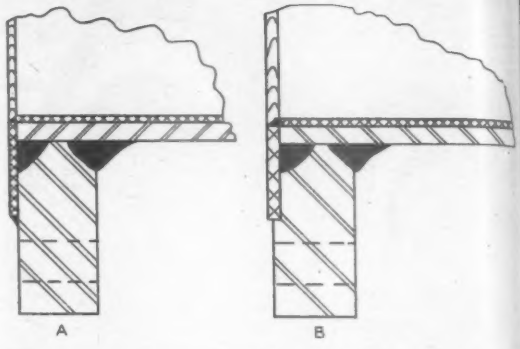


Fig. 7: Two methods for providing corrosion resisting gasket surfaces on fabricated flanges

at one time, and some of them may interfere with other adjacent fractions, but this lineup represents the average line of products which are segregated generally.

No corrosion occurs in this tower except a gradual lessening of the tower wall thickness where the hot crude enters the tower. A section of 11-13 per cent Cr lining is installed at this point. In the gasoline cooler-condensers admiralty-metal tubes are used, while water is also added to the vapor line just prior to entrance to the condensers, which helps both to condense the light vapors and to wash out H_2S formed. To eliminate all H_2S this gasoline is also washed with reclaimed (15° Be.) caustic solution prior to going to rundown-tank storage, which practically eliminates the corrosion which otherwise occurs at the gasoline-water interface on the storage-tank wall. The other products pass to storage and such further processing as may be required, a routine which is not important to the purpose of this article.

Part of the topped crude from this straight-run tower is preheated to about 825° F. in coils in the cracking furnaces and is used for quench oil, entering the transfer line from cracking coil to flash tower. More lime is added before going into these preheater coils (about 0.1 lb./bbl.) and the tubes are 4-6 per cent Cr. Crude and cracked products discharge into No. 1 vapor separator, where the temperature ranges between 700-825° F., and which is lined as outlined above. Overhead vapors pass to the cracked oil fractionator, the lower half of which is lined with 11-13 per cent Cr strip and which is fitted with alloy trays (11-13 per cent Cr). Temperatures in this tower range from 650° to 400° F.

All cracking coils are fitted with 4-6 per cent Cr tubes, or will be as soon as they can be obtained. All cracking and reforming coils are separately furnished with a lime slurry at the preheater inlet comprising about 0.20-lb. hydrated lime per barrel of cracking charge.

The heavy bottoms from the cracking unit vapor separators are reduced in the vacuum tower, normally at 26-28-in. of water vacuum at temperatures up to about 700° F. No corrosion has been found in this carbon-steel equipment as all H_2S and other corrosive compounds appear to have been eliminated before reaching that point. Overhead from this tower goes to charge stock for the cracking coils along with condensate from the vapor separator.

The reforming system caused trouble at first, and it was necessary to fit it throughout the high-temperature areas with alloy. The high-pressure bubble tower in its lower 32 ft. was lined with 11-13 Cr strip, and 12 alloy trays were installed in

TABLE 1—ANALYSIS OF TYPICAL KANSAS CRUDE

Tests

A.P.I. gravity	39.4
Specific gravity	0.8222
B.s. and w., per cent	0.20
Sulfur, per cent	0.44
Hydrogen sulfide, grams per barrel	15.0
Salt content, pounds per 1,000 bbl.	18.45
Pour point, °F.	—10

Tests on Products

	410 e.p. gasoline	Kero. dist. cut	A.P.I. gas oil	A.P.I. gas oil	120 pene. asphalt	1 pene. pitch
A.P.I. gravity	65.0	43.6	31.2	23.5	10.0	—2.2
Specific gravity	0.7201	0.8081	0.8697	0.9129	1.000	1.094
I.b.p.	92	364	...	...	...	...
10%	142	400	...	...	...	...
20%	178	412	...	...	...	...
25%	...	416	...	...	...	...
30%	194	420	...	...	...	...
40%	220	428	...	...	...	...
50%	242	438	...	...	...	...
60%	262	448	...	...	...	...
70%	276	458	...	...	...	...
80%	310	474	...	...	...	...
90%	342	490	...	...	...	...
95%	...	510	...	...	...	...
M.b.p.	410	534	...	...	...	...
Doctor	Sour	Sour	...	...	...	...
Mercaptan content, Mgs./100 ml.	7.36	12.16	...	...	...	...
Hydrogen sulfide	Heavy	Heavy	...	...	...	...
Sulfur, %	0.034	0.058	0.48	...	...	...
Octane, L-3 method	48.6	...	...	...	...	...
Color, N.P.A.	...	...	2	8	...	...
Pour point, °F.	...	...	70	100	...	...
Vis. at 100° F. S.S.U., sec.	...	...	71.6	...	...	...
Vis. at 210° F. S.S.U., sec.	...	...	46.9	61.0	...	...
Melting point (R&B), °F.	...	...	...	...	119	355
Solubility in CCl_4, %	...	...	...	...	99.76	99.71
Ductility at 77° F., cm.	...	...	...	...	100+	Nil
Oliensis	...	...	...	...	Neg.	Sl. pos.
Penetration at 77° F., M.M.	...	...	...	...	120	1

Yields

To 120 penetration asphalt:

34.60%	410 end-point gasoline
12.05%	43.6 A.P.I. kerosene-distillate
38.45%	31.2 A.P.I. gas oil
12.80%	120 penetration asphalt
2.10%	Loss
100.00%	Total

To 1 penetration pitch:

34.60%	410 end-point gasoline
12.05%	43.6 A.P.I. kerosene-distillate
38.45%	31.2 A.P.I. gas oil
6.85%	23.5 A.P.I. gas oil
5.45%	0.1 penetration pitch
2.60%	Loss
100.00%	Total

that section. All transfer lines were lined similarly. All low-carbon steel in the higher-temperature ranges, especially from about 600° to 750° F., showed accelerated corrosion with the sour West Texas-crude mixture. Some advantage is shown by 3 per cent Cr, but now 4-6 Cr alloy is the lowest being installed, mainly as tubes. The most serious corrosion occurred in this plant at the point in the cracking coils which is the transition point between liquid and vapor phases of the charge. This transition temperature is 800-850° F., with a 930° top in the coils. For a distance of 12-15 tubes this corrosion is very strong, then decreases greatly to less serious rates. Comparative rates of corrosion of tubes are indicated in Fig. 4, in which a section of one tube has been operated about 18 months on Kansas crude alone, while the other was in service for about 6 months on the Kansas-West Texas mixture. The cracking unit bubble tower is the end of the corrosion train, beyond that in the plant's cycle showing practically no corrosion from any source.

TABLE 2—ANALYSIS OF SHIPMENT OF SLAUGHTER (WEST TEXAS) SOUR CRUDE PROCESSED AT McPHERSON REFINERY

A.P.I. gravity: 31.3
Color: Dark brown
B.s. and w., 0.40%
Potential H_2S: 84.0 lb./1,000 bbl.
Free H_2S: 6.8 lb./1,000 bbl.
Per cent sulfur: 1.92 lb.
Salt content: 325 lb./1,000 bbl.
pH: 3.9 lb.
Free acidity: 2.7 lb./1,000 bbl.
Potential acidity: 22.7 lb./1,000 bbl.

Products—	350 e.p. gasoline	485 e.p. kerosene	580 e.p. distillate	Gas oil	Residuum	Loss
Per cent yield	27.6	14.6	10.0	12.7	33.7	1.4
A.P.I. gravity	58.1	42.1	34.1	27.5	13.0	...
I.b.p.	107	320	373	...	...	...
10%	157	375	484	...	...	...
20%	180	386	507	...	...	...
25%	...	392	...	...	...	...
30%	198	396	513	...	...	...
40%	212	401	518	...	...	...
50%	228	411	523	...	...	...
60%	245	420	527	...	...	...
70%	260	431	534	...	...	...
80%	277	442	543	...	...	...
90%	300	461	553	...	...	...
95%	...	480	569	...	...	...
End point	352	492	578	...	...	...
Per cent loss	1.6	0.3	0.0	...	...	...
Flash T.C.	...	130	148	...	...	...
Viscosity at 100° F.	...	...	...	57.2	...	...
Viscosity at 122° F.	...	...	...	...	314	...
B.s. and w.	...	...	...	...	0.25	...
Pour point, °F.	...	...	0	50	80	...
A.S.T.M. octane	60.0	...	...	...	...	...
A.S.T.M. +1 cc. TEL	67.4	...	...	...	...	...
A.S.T.M. +3 cc. TEL	72.3	...	...	...	...	...
Total sulfur	0.1844	0.656	1.505	2.087	3.341	...
Mercaptans	0.1762	0.108	...	...	...	...
Hydrogen sulfide	0.069	0.066	...	...	...	...
Color	29	27	*2	3-NPA	Black	...
R.v.p.	7.0	...	...	...	...	...
Odor	Poor	Poor	Poor	...	...	...

*Saybolt.

TABLE 3—ANALYSIS OF A BLEND OF 10 PER CENT SLAUGHTER CRUDE AND 90 PER CENT KANSAS CRUDE, TYPICAL OF THE MIXTURE PROCESSED AT McPHERSON FOR 6 MONTHS

A.P.I. gravity: 37.0
Color: Black
Per cent b.s. and w.: 0.4 Odor: Fair
Potential H_2S: 30 lb./1,000 bbl.
Free H_2S: 0.5 lb./1,000 bbl.
Per cent sulfur: 0.56
Salt content: 53.0 lb./1,000 bbl.
pH: 4.3
Free acidity: 2.1 lb./1,000 bbl.
Potential acidity: 13.7 lb./1,000 bbl.

Products—	350 e.p. gasoline	495 e.p. kerosene	580 e.p. distillate	Gas oil	Residuum	Loss
Per cent yield	27.0	17.0	7.8	14.2	32.0	2.0
A.P.I. gravity	66.5	44.5	38.1	31.8	17.8	...
I.b.p.	95	355	448	...	...	...
10%	143	378	505	...	...	...
20%	167	385	511	...	...	...
25%	...	389	...	...	...	...
30%	191	393	514	...	...	...
40%	209	401	517	...	...	...
50%	225	412	522	...	...	...
60%	241	422	527	...	...	...
70%	257	434	532	...	...	...
80%	276	446	539	...	...	...
90%	299	465	561	...	...	...
95%	...	476	568	...	...	...
End point	351	497	579	...	...	...
Per cent loss	2.4	0.5	0.0	...	...	...
Flash T.C.	...	128	156	...	...	...
Viscosity at 100° F., SSU	...	...	37.0	58.5	...	...
Viscosity at 122° F., Furol	...	...	...	...	327	...
Per cent b.s. and w.	...	...	...	...	0.7	...
Pour point, °F.	...	...	5	55	75	...
A.S.T.M. octane	53.4	...	...	...	...	...
Oct. +1 cc. TEL	66.4	...	...	...	...	...
Oct. +3 cc. TEL	74.2	...	...	...	...	...
Per cent total sulfur	0.036	0.086	0.242	0.57	1.11	...
Per cent mercaptan sulfur	0.026	0.016	...	...	...	...
Color	30	27	16	2½-NPA	Black	...
R.v.p.	7.8	...	...	...	...	...
Per cent H_2S	0.0143	0.057	...	...	...	...
Odor	Poor	Poor	Poor	...	...	...

Detailed discussion of the products obtained from this crude mixture, and of their properties and methods required for complete refining will be reserved for another article. It has been found that the kerosene made with sulfur content of 0.10 per cent or lower does not go offcolor in storage. Finished gasoline from the 15 per cent (maximum used) West Texas mixture shows 0.11 per cent S, which is well within the maximum state and federal specifications of 0.25 per cent. Before sweetening the mercaptan sulfur content is about half that, or 0.05 per cent. Straight-run gasoline from a 15-per cent mixture of crudes (375° F. end point) shows about 0.06 per cent total S. The crude products are sweetened by doctor solution regenerated by a Bayway system. The plumbite system includes large orifice-type mixing coils in which 1½ minutes are used for mixing. Added sulfur is metered in and the amount controlled with great care. The butyl mercaptan test shows 45 minutes, indicating absence of polysulfides from the finished product. Up to 75 per cent of the mercaptan is removed by the counter-current caustic washing, and the mercaptan is removed from the caustic by steaming in a regeneration tower.

No NH_3 (ammonia) is used in the plant, nor is it necessary so far to use monel metal in the tops of fractionators, for example, with the type of crude mixture which has been desalted and processed. However, combined H_2S removal and sweetening costs for litharge, flowers of sulfur and caustic have been doubled by handling 15 per cent of West Texas crude. The earlier cost was about 0.2 cents per barrel of sweetened product, which has risen to approximately 0.4 cents per barrel.

Methods for Lining and Fitting Equipment

Piping layouts in corrosive zones throughout the refinery are installed according to plant engineering standards which regulate the type of piping items used. Based upon relative costs of commercial ready-to-install and plant-fabricated items the piping standards for this particular plant show that carbon-steel pipe lined with 11-13 Cr for sizes

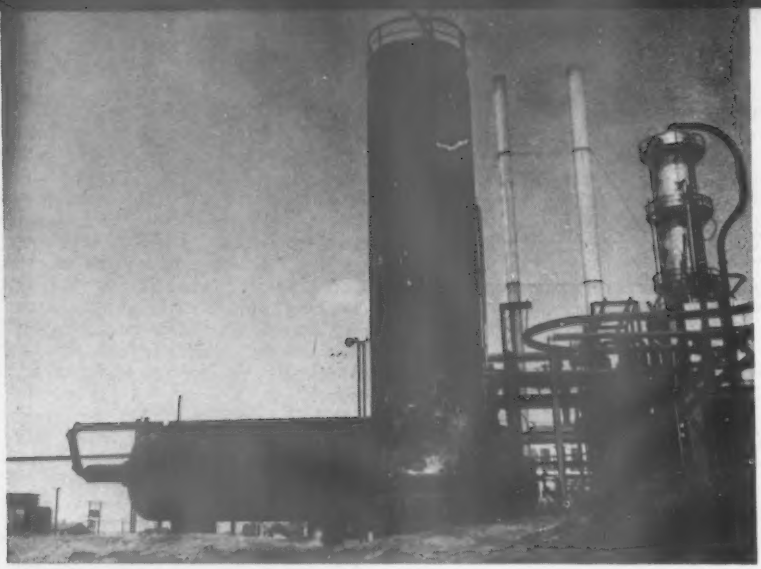


Fig. 8: Desalting unit employed to process mixture of Kansas and Slaughter crudes. About 90 per cent of the contained salt is removed by this unit

above 8-in. are economically superior to seamless 4-6 Cr. And for valves which may be either carbon-steel bodies with a metallic coating and an alloy trim or cast 4-6 Cr bodies and trim the balance point in economy is given at the 6-in. sizes. For fittings, such as tees, elbows, reducers and the like, cast 4-6 Cr is specified for all sizes.

Heat exchangers, condensers and other heat-transfer equipment are worked out with different grades of chromium-alloy tubes and lined channels and covers where corrosive action is on the tube side of the exchanger. Where the shell side is to be operated in corrosive service alloy tubes are installed and the shell and other exposed parts are lined with 11-13 Cr. For service where corrosive action is on both shell and tube sides the exchanger is worked up by combining the shell and tube construction of the two different corrosion-resisting units.

In making the changeover to corrosion-resisting exchangers all units where corrosive action was on the shell side were provided with new carbon-steel 11-13 Cr lined shells with the original channels and covers metal coated in most cases. Many of the heavier fittings, such as series 150 tees, were salvaged by rebuilding in the refinery machine shop.

The over-all cost for reclaimed pipe fittings shows an economic advantage for the heavier items somewhere about 8-in. and upward, over items made of cast alloy. Procedure, as set up in the engineering standards, calls for a detailed inspection of the salvaged item before any shop operations are to be made. If inspection indicates that an item may be economically rebuilt the item is then processed through the machine and welding shops. First of the shop operations is to remove the rough, eroded surface from the bore and faces of the item. This operation is carried out either on a mill or on a lathe, depending upon the fitting size. Often two or more cuts are necessary to finish the bored surface because of very rough eroded surfaces. After making the final bore and facing cuts, the fitting is taken to the weld shop where it is built up with deposited weld metal to a point which will allow other boring and facing operations to be made. In order to insure a uniform surface after boring the deposited weld metal normally is applied such that from little less than to greater than one bead or pass is removed in the operation.

After the reboring and refacing operations, the fitting is again taken to the weld shop where a two-pass layer of alloy weld metal is deposited on all exposed surfaces which are subsequently hand ground to remove objectionable irregularities and weld splatter from the bore.

Final machining is carried out on the gasket bearing surfaces of the fitting to complete the rebuilding operations. Fig. 1 is typical of the bore condition of most fittings which have passed inspection.

Lining of straight and curved sections of pipe is carried out in the same manner. In the case of curved sections the pipe is first formed to the desired dimensions and then cut into lengths of from 40 to 50 in. as determined by pipe size and by the total length of the bend; straight sections are handled likewise. All abutting edges of the sections are machined with a bevel of about 35° and with a land which runs between $\frac{1}{16}$ and $\frac{1}{8}$ in. Typical finished sections are shown in Fig. 2.

The corrosion-resisting liner, a 11-13 Cr material, is supplied to the pipe in approximately 4-in. strips with 25-20 type 310 alloy electrodes. Lining-strip widths worked out in multiples of pipe circumferences seldom exceed 4 in. and in thickness greater than $\frac{1}{8}$ in.

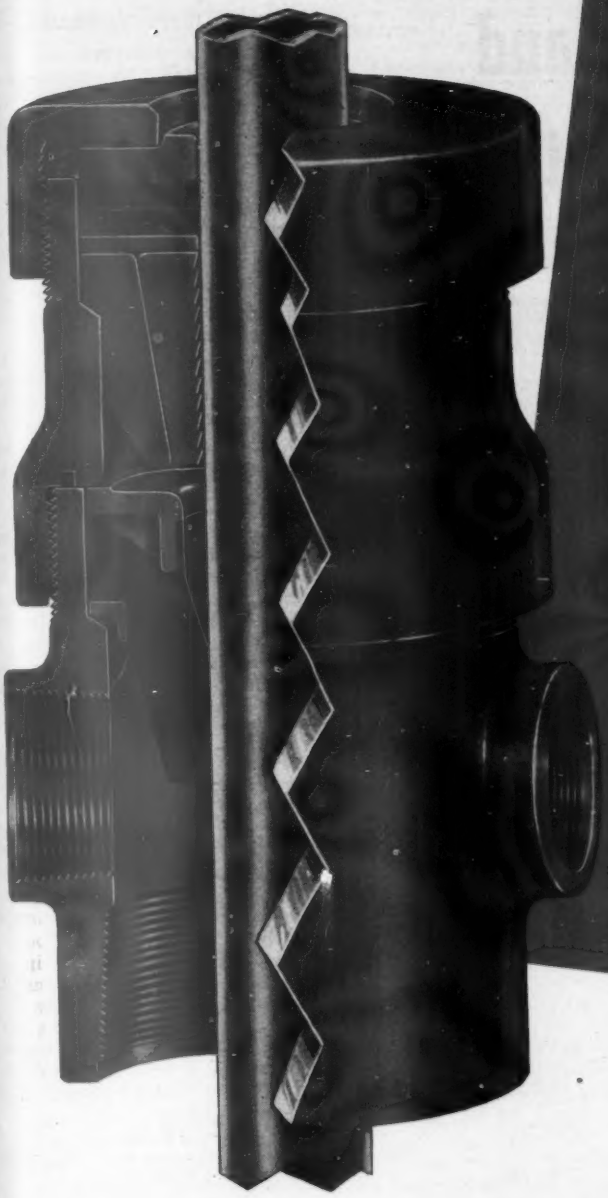
Single-pass welds which serve to join the adjacent liner strips and to bond the seam to the carbon steel backing are made with electrode sizes and current ratings according to manufacturers' recommendations. Space between adjacent strips is held as small as practicable in order to give a slight overlay for the welded seam and to avoid excessive contamination of the alloy metal by the carbon-steel backing.

An approximate outline of the zone of fusion for an ideal liner joint is illustrated in Fig. 5-A. Fig. 5-B illustrates the method used in joining two lined sections of pipe as developed at this plant where three passes are made in the carbon-steel part of the assembly and one closure pass for joining the alloy liner.

Either butt-weld or slip-on flanges are used in the piping design as regulated by pressure-temperature service conditions. Fig. 6-A shows how slip-on type flanges are altered for corrosive services, and Fig. 6-B that for butt-welding flanges. In altering raised-face flanges for use with corrosion-resisting lined pipe the gasket bearing surface of the flange is removed to about $\frac{1}{8}$ in. below the common surface of the flange and the recess filled with deposited alloy weld metal by two or more passes to a height which will allow machine finishing gasket bearing surface to original dimension.

Flanges having large or small tongue and groove or other type of gasket surfaces are handled in a similar manner by removing sufficient carbon-steel metal to allow the rebuilding of all surfaces which are exposed to corrosive action with two or more passes of alloy weld metal.

Heat-exchanger shells are lined in the same manner as are straight and curved sections of pipe. Typical of either pipe or exchanger linings, as well as flange preparation, is shown in Fig. 3, a photograph of a lined heat-exchanger shell; the smaller flange is lined with strips running circumferentially as is often done for short runs such as for butt-welding flanges or other like attachments. All replacement heat-exchanger shells are refinery-shop fabricated with flanges made of carbon-steel rings which are cut from rolled plate. How this type flange is attached to the shell by welding and how it is made corrosion resisting is illustrated in Fig. 7. The flange in Fig. 7-A is dimensionally identical with that in 7-B. The difference between the two flanges is that the flange in 7-B has its gasket surface built up with weld metal and requires recessing whereas 7-A has an alloy ring attached by fillet welding for the gasket surface and requires no recess in the steel ring.



Where Else

CAN YOU GET ALL THESE TUBING HEAD FEATURES?

1. Forged steel construction.
2. Neoprene stripper.
3. Full opening for tools or packers.
4. Complete interchangeability of parts.
5. 4,500 pound test.
6. A blowout preventer and oil saver while running or pulling tubing.
7. Easy conversion from flowing to pumping.
8. Low initial cost . . . minimum upkeep.
9. Worldwide users' approval.

Get full details on this strong, safe, economical tubing head from your 1943-44 Composite Catalog, pages 1604-5.

You'll find this valuable combination of features in no other tubing head in the same price field. We invite comparisons with any competitive head. The Larkin Tubing Head serves safely from completion to depletion . . . running or pulling tubing, flowing, pumping, gas-lift, or working over well.

LARKIN

LARKIN PACKER CO., INC.

ST. LOUIS, MO.

WAREHOUSES: Houston, Corpus Christi, Odessa, Shreveport, Tulsa, Great Bend, Salem.
EXPORT: 74 Trinity Place, New York City

Molal, Weight, and Volume Composition

by Park J. Jones *

Mechanics of Producing Oil, Condensate, and Natural Gas

PART 12 OF A SERIES

Hydrocarbon analyses are commonly reported by components through hexanes. Heavier components, if present, are usually lumped together and reported as heptanes plus. The specific gravity and the molecular weight of the heptanes plus component are required for the purposes of material balance calculations. Small quantities of impurities may be included with methane. If significant quantities of impurities are present, they are considered as separate components.

In practice, compositions are expressed on a molal basis, weight basis, gas volume basis, and liquid volume basis. The various steps in converting from one basis to any other basis are illustrated by examples.

If the production from a well is passed through a separator and the separator liquid and gas are metered and analyzed, the gas and liquid can be recombined to obtain the composition of the production. If the separator liquid is not metered, its volume can be estimated from the composition of the corresponding stock tank liquid.

THE composition of a gas or a liquid is commonly reported in mole per cent or mole fraction. The molal composition of n-component liquids is defined by

$$\sum_{i=1}^{n} x_i = 1 \qquad (1)$$

where

x_i = mole fraction of the ith component in a liquid

n = number of components

The molal composition of n-component gases is defined by

$$\sum_{i=1}^{n} Y_i = 1 \qquad (2)$$

where Y_i is the mole fraction of the ith component in a gas. But the number of molecules per unit volume of an ideal gas at standard conditions equals the number of molecules in any other ideal gas per unit volume at standard conditions. Therefore, gas-volume composition is the same as the molal composition of a gas.

Weight Composition

Let W_i represent the weight fraction of a component in either a gas or a liquid. The weight composition of a gas or a liquid is then defined by

$$\sum_{i=1}^{n} W = 1 \qquad (3)$$

Let M_i represent the molecular weight of a component. The conversion from gas volume composition to weight composition is then defined by

$$W_i = \frac{(YM)_i}{\Sigma\,(YM)_i} \qquad (4)$$

where the symbol $(YM)_i$ stands for Y_iM_i.

Similarly, the conversion from molal composition to weight composition is defined by

$$W_i = \frac{(XM)_i}{\Sigma\,(XM)_i} \qquad (5)$$

Table 12-1 illustrates the steps in converting from molal, or gas volume, to weight composition.

The conversion from weight composition to molal composition is defined by

$$X_i = \frac{(W/M)_i}{\Sigma(W/M)_i} \qquad (6)$$

Table 12-2 illustrates the steps in converting from weight to molal composition.

Liquid Volume Composition

Let L_i represent the fraction by volume of a component in a liquid. Liquid volume composition is then defined by

$$\sum_{i=1}^{n} L_i = 1 \qquad (7)$$

Let S_i represent the specific gravity of a component relative to water. The conversion from weight composition to liquid volume composition is then given by

$$L_i = \frac{(W/S)_i}{\Sigma\,(W/S)_i} \qquad (8)$$

*Production consultant, Houston.

TABLE 12-1—ILLUSTRATING CONVERSION FROM MOLAL TO WEIGHT COMPOSITION

Component—	Mole (per cent)	Molecular weight	Relative weights	Weight (per cent)
Methane	92.8	16	14.848	83.42
Ethane	3.79	30	1.137	6.39
Propane	1.97	44	.867	4.87
Butanes	.96	58	.557	3.13
Pentanes	.38	72	.202	1.13
Hexanes	.13	86	.112	.63
Heptane+	.07	106	.076	.43
	100.00		17.799	100.00

TABLE 12-2—ILLUSTRATING CONVERSION FROM WEIGHT TO MOLAL COMPOSITION

Component—	Weight (per cent)	1/(molecular weight)	Relative volumes	Mole (per cent)
Methane	83.42	.0623	5.1971	92.79
Ethane	6.39	.0333	.2128	3.80
Propane	4.87	.0227	.1105	1.97
Butanes	3.13	.0172	.0538	.96
Pentanes	1.13	.0139	.0157	.28
Hexanes	.63	.0116	.0073	.13
Heptane+	.43	.0093	.0040	.07
	100.00		5.8012	100.00

TABLE 12-3—ILLUSTRATING CONVERSION FROM WEIGHT TO LIQUID VOLUME COMPOSITION

Component—	Weight (per cent)	1/(Sp. gr.)	Relative liq. vols.	Liq. vol. (per cent)
Propane	.34	1.965	.668	.56
i-Butane	.27	1.773	.479	.40
n-Butane	.34	1.712	.562	.48
i-Pentane	.38	1.603	.609	.51
n-Pentane	.46	1.585	.729	.61
Hexanes	1.42	1.506	2.139	1.78
Heptane+	96.79	1.187	114.890	95.66
	100.00		120.096	100.00

TABLE 12-4—ILLUSTRATING CONVERSION FROM LIQUID VOLUME TO WEIGHT COMPOSITION

Component—	Liq. vol. (per cent)	Sp. gr.	Relative weights	Weight (per cent)
Propane	.56	.509	.285	.34
i-Butane	.40	.564	.226	.27
n-Butane	.48	.584	.280	.34
i-Pentane	.51	.624	.318	.38
n-Pentane	.61	.631	.385	.46
Hexanes	1.78	.664	1.182	1.42
Heptane+	95.66	.842	80.546	96.79
	100.00		83.222	100.00

TABLE 12-5—ILLUSTRATING CONVERSION FROM LIQUID TO GAS VOLUME COMPOSITION

Component—	Liq. vol. (per cent)	M.c.f./bbl.	Relative gas vols.	Gas vol. (per cent)
Propane	.56	1.54	.862	1.63
i-Butane	.40	1.29	.516	.97
n-Butane	.48	1.33	.638	1.20
i-Pentane	.51	1.15	.586	1.11
n-Pentane	.61	1.16	.708	1.34
Hexanes	1.78	1.02	1.816	3.43
Heptanes+	95.66	.50	47.830	90.32
	100.00		52.956	100.00

TABLE 12-6—ILLUSTRATING CONVERSION FROM GAS TO LIQUID VOLUMES COMPOSITION

Component—	Gas vol. (per cent)	Bbl./M.c.f.	Relative liq. vols.	Liq. vol. (per cent)
Propane	1.63	.654	1.066	.56
i-Butane	.97	.777	.754	.40
n-Butane	1.20	.751	.901	.48
i-Pentane	1.11	.873	.969	.51
n-Pentane	1.34	.863	1.156	.61
Hexanes	3.43	.979	3.358	1.78
Heptanes+	90.32	2.000	180.640	95.66
	100.00		188.844	100.00

Table 12-3 illustrates the steps in converting from weight to liquid-volume composition.

The conversion from liquid volume to weight composition is defined by

$$W_i = \frac{(LS)_i}{\Sigma\,(LS)_i} \qquad (9)$$

Table 12-4 illustrates the steps in converting from liquid volume to weight composition.

Gas-Volume Composition

The conversion from liquid-volume composition to gas-volume composition is given by

$$Y_i = \frac{(L\,S/M)_i}{\Sigma\,(L\,S/M)_i} \qquad (10)$$

Table 12-5 illustrates the steps in converting from liquid volume composition to gas volume composition.

The conversion from liquid volume composition to molal composition is the same as equation (10) except the symbol X_i is substituted for Y_i.

The conversion from gas volume composition to liquid volume composition is defined by

$$L_i = \frac{(Y\,M/S)_i}{\Sigma\,(Y\,M/S)_i} \qquad (11)$$

Table 12-6 illustrates the steps in converting from gas-volume composition to liquid-volume composition. The conversion from molal composition to liquid-volume composition is the same as equation (11) except that X is substituted for Y.

Summary of Composition

The foregoing discussion on composition may be summarized as follows:

Multiply	By	And obtain
Y or X	M	W
W	1/M	Y or X
L	S	W
W	1/S	L
Y or X	M/S	L
L	S/M	Y or X

The values of M, 1/M, S, 1/S, M/S, and S/M were given in Table 1 of the article preceding this one.

Molecular Weight and Gas Gravity

The average molecular weight of a gas is defined by

$$M = \Sigma\, Y_i M_i \qquad (12)$$

The specific gravity G of a gas relative to air is given by

$$G = M/28.97 = \frac{\Sigma\, Y_i M_i}{28.97} = Y_i G_i \qquad (13)$$

where G_i is the specific gravity of the components in a gas.

Composition of Production

Suppose the production from a well is passed through a separator and the separator gas and liquid are metered. Let the separator gas and liquid be sampled and analyzed to obtain the results shown in Table 12-7. The problem is to find the composition of the production.

Table 12-8 illustrates the steps in calculating the composite production from a well. The gas rate is distributed in M.c.f./day by components, that is, the total rate times the mole fraction of a component in the gas production is the rate of component production in the gas.

The liquid rate is first distributed as barrels per day by components, that is, the total bbl./day times the liquid volume fraction of a component in the liquid is the rate of component production in the liquid. Next multiply bbl./day of each component by its M.c.f./bbl. factor given in Table 1 of the article preceding this one. The result is liquid as M.c.f./day. The sum of liquid as M.c.f./day and gas in M.c.f./day by components is the total M.c.f./day for each component. Redistribute M.c.f./day by components as per cent of total M.c.f./day to obtain the composition of the production.

The Volume of a Separator Liquid

In the preceding discussion on the composition of the production from a well, it was assumed that the separator liquid was metered. The more common practice is to gage the oil-producing rate and to analyze the oil. Given the composition of a separator liquid, the oil-producing rate, and the composition of the oil, the following method may be used to estimate the volume rate of a separator liquid: (1) convert the oil analysis from mole or weight composition to liquid volume composition, and (2) convert the separator analysis to liquid volume composition. The volume rate of separator liquid production is the defined by

$$Q_s = Q_o\, L_{7+,o}/L_{7+,s} \qquad (14)$$

where

Q_o = rate of oil production, bbl./day

$L_{7+,o}$ = liquid volume fraction of heptanes plus in oil

$L_{7+,s}$ = liquid volume fraction of heptanes plus in separator liquid

Q_s = rate of separator liquid production, bbl./day.

The procedure for estimating the composition of the production from a well then follows the steps illustrated in Table 12-8.

TABLE 12-7—COMPOSITION OF SEPARATOR GAS AND LIQUID

Component	Separator gas mole %	Separator liquid liquid volume %
C_1	96.8	2.0
C_2	1.0	0.6
C_3	1.1	1.1
iC_4	0.3	0.9
nC_4	0.3	1.3
iC_5	0.2	1.6
nC_5	0.1	1.0
C_6	0.2	3.8
C_{7+}		87.7
	100.0	100.0
Specific gravity of heptanes plus		0.775
Molecular weight of heptanes plus		144

Bbl. per day = 462.7 M.c.f. per day = 5.783

TABLE 12-8—ILLUSTRATING COMPUTATION OF COMPOSITE COMPOSITION

Component	Gas, M.c.f./ day	Liquid Bbl./ day	Liquid M.c.f./ bbl.	Liquid M.c.f./ day	Composite M.c.f./ day	Composite Mole (%)
C_1	5,598	9.25	2.48	23.0	5,621.0	91.37
C_2	58	2.77	1.67	4.6	62.6	1.01
C_3	64	5.09	1.54	7.8	71.8	1.17
iC_4	17	4.16	1.29	5.4	22.4	0.36
nC_4	17	6.02	1.33	8.0	25.0	0.40
iC_5	11	7.40	1.15	8.5	19.5	0.32
nC_5	6	4.63	1.16	5.4	11.4	0.18
C_6	12	17.58	1.02	17.9	29.9	0.48
C_{7+}		405.80	0.714	289.7	289.7	4.71
	5.783	462.70		370.3	6,153.3	100.00

PROGRESS IN METALS

by W. L. Nelson

Consulting Engineer

Sulfurized Cutting Oils

SULFUR, when added correctly to mineral oils or mineral-lard oils, increases cooling and lubricating ability, helps to prevent welding of chip to tool, permits more rapid cutting, and gives smoother surface finish on steel, because of added film strength and easier penetration to small crevices.

Sulfurized cutting oils are unsuitable for machining brass or nonferrous alloys, because the sulfur causes the surfaces of these metals to turn black.

Where visibility is desirable, reduced viscosity of oil is important. Oils of this nature are especially adapted to the machining of low, medium and high-carbon steels and the several types of alloy steels used for precision and heavy-duty machinery. The corrosiveness of a sulfur cutting oil can be reduced by heating the oil sufficiently to cause the free sulfur to react with the mineral oil to form noncorrosive products.

The cutting speed for a given life of tool decreases almost directly as the hardness of steel increases. Cutting speed influences greatly the quality of machined surfaces, independently of other factors. In cutting a steel at low speed the finish is usually poor. Under these conditions a high rake, a light feed, and a cutting oil containing sulfur or chlorine should be used.

As the cutting speed increases the finish becomes better. For each structure a cutting speed is obtained at which the built-up edge disappears. The speed at which this superior finish is obtained varies not only with the type of steel cut, but also with the structure of the steel. This speed is lowest for the hardest metals and highest for the softest metals.

In normal cutting, cooling is believed to be the primary function of the fluid, so that aqueous solutions or emulsions are more desirable. These should be applied at relatively low temperature (about 80 to 110° F.) in large quantities and at high velocity.

In the study of sulfurized cutting oils, both laboratory and field research were conducted. Cutting of pipe threads afforded an excellent means of evaluating oils.

The lead-abrasion method is dependable for testing the smoothness of cut surfaces. A heavy-duty turret lathe is used to make a cut on the end of a piece of lap-welded or seamless steel pipe. The roughness of the cut surface is measured in terms of inches of lead worn off when a pencil-lead abrasion apparatus is passed over a definite linear distance of the surface. Pressure in the pencil lead is kept essentially constant regardless of the wear on the lead.

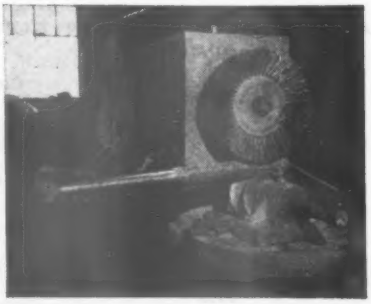
Sulfur cannot be added at random to a mineral oil. The manner of compounding and the nature of the materials to be compounded are the salient factors.

An abstract of Sulfurized Cutting Oils by A. F. Brewer, Steel, Vol. 114, May 1, 1944, page 104, taken from Metals & Alloys, July 1944.

Brushing Old Pipe

PIPE-CLEANING operations of Builders Structural Steel Co. of Cleveland, are described in a recent issue of Metals & Alloys by C. O. Rowland, of Osborn Manufacturing Co. He points out the importance of salvage, particularly pipe that is covered by rust and scale. A quick way of restoring pipe surfaces is by the use of a rotating wire brushing wheel of the proper size and gage of wire. Combinations of two, three, four or more wire brushing wheels with disk center are mounted on a spindle powered by an electric motor. This permits the cleaning of several sizes of pipe. The wire wheels revolve at 1,800 r.p.m. and a wire gage of about 33 is employed.

Pipe is inserted between the revolving brush and a roller that is mounted on the bed of the equipment. The pipe is pushed back and forth under the brush through a distance of 10-12 in. and is rotated by the operator to clean all sides of the work. Several roller fixtures are available so that different sizes of pipe can be handled, and also the roller position is adjustable by means of a hand crank so that the pressure of the brush can be regulated. The method is said to be 10 times faster than hand methods of cleaning, in addition to the advantage of doing an effective job of cleaning.



Reclaiming old pipe by brushing

The Lost Wax Process

THE petroleum-refining industry is a major supplier of wax and hence the following abstract of the use of wax patterns will be of interest.

In the lost wax process, a pattern of wood or other material is made true to size and shape without taper or loose pieces. Over this a quick-setting investment, such as plaster of paris, is molded, having as many partings as are necessary for the various pieces of the investments to be removed without difficulty when they have set hard.

After the pattern is removed, the investment is again pieced together and used to produce a number of wax patterns. A number of these wax patterns are placed together with a suitable sprue from each joining to a central runner.

The whole group is then encased with a suitable material to form a new mold and, after setting, the wax is melted out. While still hot, molten metal is run or forced into the mold.

The original pattern is not lost, and any number of wax castings may be made. Though a ceramic material is generally used for the mold, it seems reasonable to suppose that sand with a suitable binder, such as core gum, could be employed, providing the material would dry sufficiently to cause the investment to set sufficiently hard to keep its shape during the melting out of the wax pattern and the subsequent baking.

The process is used for small intricate castings weighing a few ounces, and it is claimed that the casting can be of such accuracy that no subsequent machining is necessary. Castings in yellow brass and various bronzes are readily made, and some degree of success has been achieved with iron and steel.

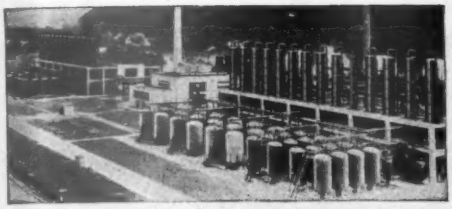
Abstract of The Lost Wax Process by J. F. Driver, Foundry Trade Journal, Vol. 73, July 6, 1944, page 186 and taken from the October 1944 issue of Metals & Alloys.

Metallurgical Terms

Bessemer Process

The Bessemer process is a steelmaking process in which air is blown through molten pig iron so that the impurities are thus removed by oxidation.

EQUIPMENT HEADQUARTERS!



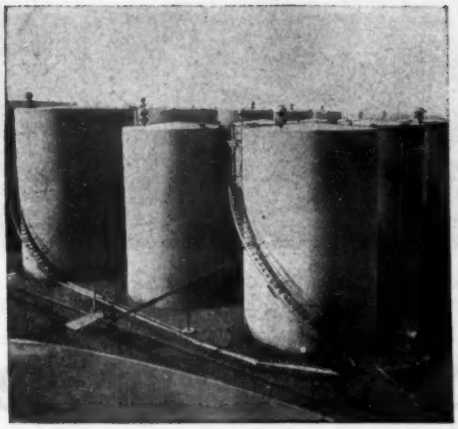


PLATE FABRICATION (EITHER WELDED OR RIVETED)

The General American line also includes all the multitude of plate-fabricated equipment manufactured by the Plate & Welding Division at Sharon, Pa.

Accumulators, agitators, autoclaves, air receivers, bins, car tanks, boiler drums, condensers, columns, digesters, heat exchangers, dryers, filters, mixing and blending tanks, fractionating towers, stacks, storage tanks of all sizes for water, oil, molasses, alcohol, gasoline and other products; stills, scrubbers, large diameter welded or riveted pipe, refinery equipment including all types of pressure vessels, and general plate fabrication—in carbon, stainless and alloy steels, Everdur, aluminum and other special alloys. . . . Built to API-ASME, ASME or other codes. General American maintains a complete laboratory for physical and chemical testing. . . . X-ray facilities. . . . Heat treating and stress relieving furnaces. . . . Completely equipped organization for foreign and domestic field erection of shop prefabricated units.

WRITE for all the FACTS!

In addition to its excellent production facilities, General American offers you a unique combination of research and engineering skills. Its Research and Development Laboratories at Sharon and Louisville are models for the industry. We would be glad to send you full information about any of our products—our research and development facilities—our ability to serve you well. Correspondence with engineering firms is especially invited. *Address:*

GENERAL AMERICAN
TRANSPORTATION CORPORATION

PLATE & WELDING DIVISION
PROCESS EQUIPMENT DIVISION

GATX GENERAL AMERICAN

General Sales Offices: 420 Lexington Avenue, New York 17, N. Y.
Works: Sharon, Pa., and Louisville, Ky.

Sales Offices: Louisville, Chicago, Sharon, Cleveland, Pittsburgh, St. Louis, Salt Lake City, San Francisco, Tampa, Washington, D. C.

Drilling on artificial earthen island at Bayou Des Glaise. At left is turnaround extension and loading dock fronting on main canal slip. At right is power and mud pump barge in auxiliary slip at side of island

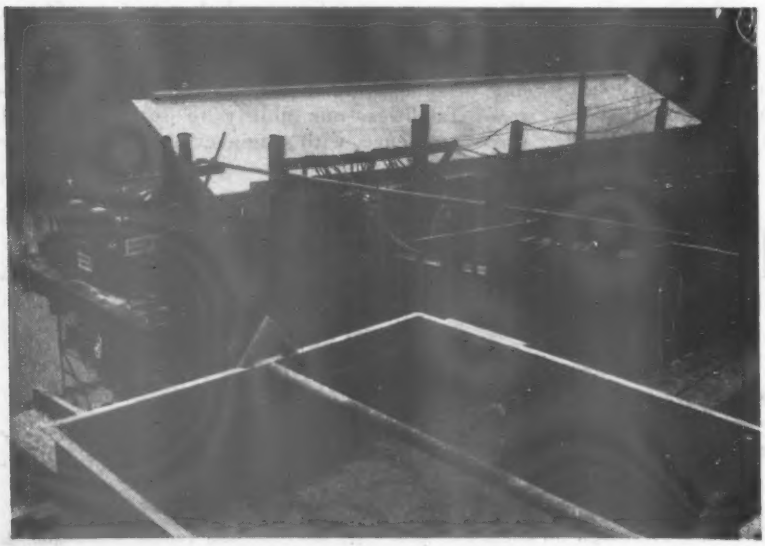
Provision of Drilling Sites Poses Difficult Engineering Problems in Louisiana Field

by Neil Williams

THE Bayou Des Glaise field, Iberville Parish, Louisiana, presents some of the most unusual and difficult engineering problems in providing drilling sites and rig foundations that have yet been encountered on the Gulf Coast. The field is located in the condemned spillway of the Atchafalaya River flood basin, where water rises to a depth of from 3 to 4 ft. above normal ground level during flood seasons, lasting from 4 to 5 months each year. Entirely isolated from roads, it is serviced by boats through adjacent navigable streams and dredged canals, in which the water level drops as much as 18 ft. below the normal ground surface during periods of low water.

Ground conditions during low-water seasons are such that mat foundations could be used for standard land-rig operations. However, the periodic overflows prevent this and make necessary the elevation of all structures above the anticipated high-water level. Also, sedimentation is very rapid. During a single overflow as much as 1 ft. of silt has been deposited. Within the past 11 years, the average ground level where the field now is located has been raised more than 7 ft. by silt depositions.

Normally, in fields serviced through waterways, drilling barges can be, and generally are used, providing a convenient and time-saving means of development. However, in this case, because of the variance of from 22 to 23 ft. in water level between low and flood stage, barges cannot be utilized. The largest submersible drilling barges are designed for operation in 10 to 15 ft. of water.



Power and mud pump barge tied up in auxiliary slip at side of earthen island as viewed from derrick floor looking over mud ditch. At front end of barge is transformer installation with power cables strung to drilling rig

During high-water periods, the barges would be flooded. At other times, there would not be enough water to float and move them. In low-water periods, depth of the water at places may be just barely enough for some of the lighter service boats and barges to operate.

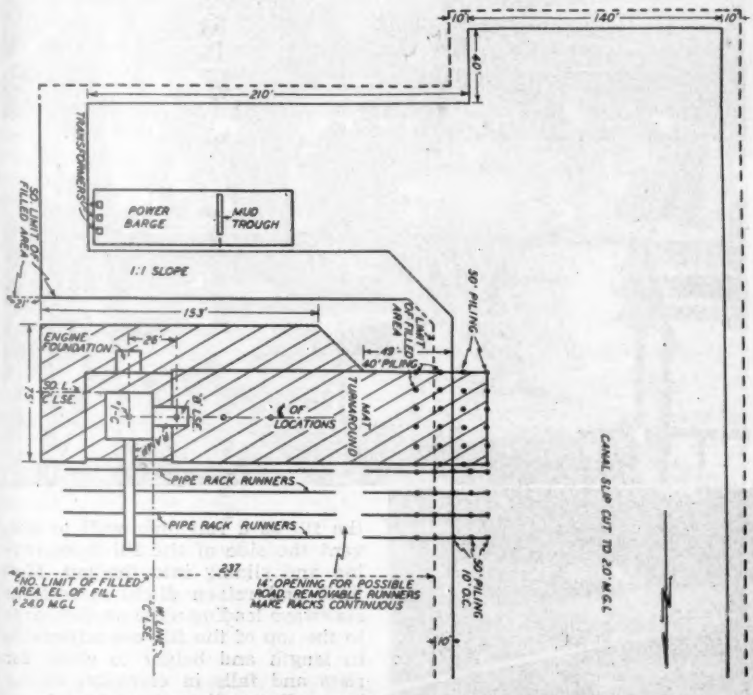
Piling structures were provided for first drilling in the field but due to the elevation required, their construction was difficult and costly. As a solution to the problem, Humble Oil & Refining Co., the present sole operator in the field, has undertaken to construct earthen mounds, or "islands", for drilling sites. These are thrown up above the anticipated high-water level, using the earth excavated from canals and slips dredged for the locations. Packed and covered with a timbered mat, these mounds make a substantial and relatively low-cost foundation.

The discovery well, completed last March, was drilled from the first earthen mound to be constructed. In that case, the fill was made for only one surface location, since it was not known at that time what to expect in the way of production or future locations. With production established, and because of the difficulties and costs of preparing individual drilling sites, the development program now calls for building centrally located fills designed to accommodate a multiple number of grouped surface locations from which the wells will be drilled directionally to their respective subsurface objectives.

Drilling rig as viewed from power barge tied up in auxiliary slip at side of earthen island, showing row of piling serving as bulkhead to prevent caving and bank slides

The first of these centrally located island fills is now in use with the first well being drilled. Design and construction details of this job are shown in an accompanying diagram. The layout provides for four wells with surface locations spaced 26 ft. apart in a single row. The first location to be drilled is located 178 ft. back and is the farthest from the canal front. As each well in turn is drilled and completed, the derrick and rig will be skidded forward to the next successive location.

Elevation of the fill is 24 ft. M.G.L. (mean Gulf level), placing the surface approximately 6 ft. above the average natural ground level and from 2 to 3 ft. above maximum high water level. The fill covers an area approximately 150 ft. wide by 237 ft. long, fronting its width along the canal slip serving the location. The canal and entire slip from which the earth for the fill was obtained was box cut from the surface elevation of 18 ft. M.G.L. to a depth of —2.0 ft. M.G.L., a total cut of 20 ft. This depth was required by the great fluctuation in water level to insure adequate water depth in the canal and slip at all times for barge and boat operation. Excavation and filling was done with a bucket-type, drag-line dredge, having a 6-cu. yd. bucket and a 250-ft. boom, the largest in the world.



Diagrammatic layout of centrally located drilling island showing main canal slip at right. Present drilling well is at left end of turnaround

Working-Space Flooring

Turnaround and working space is floored solidly with a matting of heavy planks. Arouhd the four well locations and for a distance of 153 ft. forward from the back side of the fill, the mat is 75 ft. wide. There, the width is reduced to 50 ft. to the canal and loading dock. Because of the sloped bank and possible earth slides, the turnaround and dock extends 20 ft. out over the canal to deep water to enable barges to tie up to it for loading and unloading regardless of the height of the water. The portion of the turnaround and dock over the canal is supported by piling, with two rows of 50-ft. piles being driven for this purpose. A hoisting boom and winch are installed at the dock to lift equipment and supplies when the water is low and tops of barges are below the level of the turnaround. A portable ramp is used when the water is high and the decks of barges are above the level of the turnaround.

Additional rows of 40-ft. piling were driven along the bank of the canal as a bulkhead to prevent the

Original earthen island constructed for drilling of Bayou Des Glaise discovery well (not visible at right). Piles are being driven as foundation for additional stock tank. At left fronting on canal is loading dock

bank from sliding and to retain the near vertical slope of the fill. They also serve as extra support for the turnaround. Considerable trouble was experienced from slides in the first fill made for the discovery well before a piling bulkhead was put in. In that case the piles were not driven until after excavation of the canal to the location, and between the period of canal excavation and completing the bulkhead for the fill the water level fell approximately 10 ft. To avoid this trouble on the second job, now in use, the retaining-wall piles were driven before excavation of the canal was started. It was decided at that time that on all subsequent locations the bulkhead should be installed either while the water level is high or, if the water level is low, before starting excavating the canal.

Remainder of the space on top the fill is taken up with the pipe rack which was designed to service all four well locations. Pipe-rack runners, paralleling the turnaround, extend the full length of the fill from the canal past the farthest location, which is the first well being drilled. Like the turnaround the runners extend out over the canal on piling supports to permit loading and unloading pipe direct from barges to the rack, on which the pipe can be rolled without interruption to any of the four wells desired.

A "high-line", A.C. current electric rig is being used. In this advantage has been taken of a high-voltage main power transmission line which passes within a mile of the field to avoid a difficult job of hauling fuel for a power rig. With only one well completed there still is insufficient gas to fuel boilers for a steam rig.

Mud Pump and Power Barge

Mud pumps, mud pits and various auxiliary pumping units, as well as transformers and other power control equipment, are installed on a single power barge. This barge is of the floating type so it can rise and fall with the fluctuating water level. Unlike the derrick and actual drilling equipment, the units installed on this barge do not have to remain stationary at any specific level. Being on the barge they can remain in place during well moves, saving tearing down and reassembling.

The mud pump and power barge, on which the equipment is completely housed, is tied up alongside the fill in an auxiliary slip cut back from the main slip and canal on which the location fronts. This is approximately 80 ft. wide and about 210 ft. long, extending nearly to the back of the filled-in area. A row of piling is driven along the side of the fill as a retaining wall to prevent the side of the fill from caving and sliding into the cut. Mud lines and return ditch, as well as stairways leading up from the barge to the top of the fill, are adjustable in length and height to allow for rises and falls in elevation of the barge. Power lines from transformers and controls on the barge to the

Right: Interior of power and mud pump barge. In front, near center and extending across the width of the barge are two steel mud pits. In rear are two electrically powered 20-in. mud pumps. Below: Top of earthen drilling island showing portion of matted turnaround extending back to the rig with portion of pipe rack (left foreground)

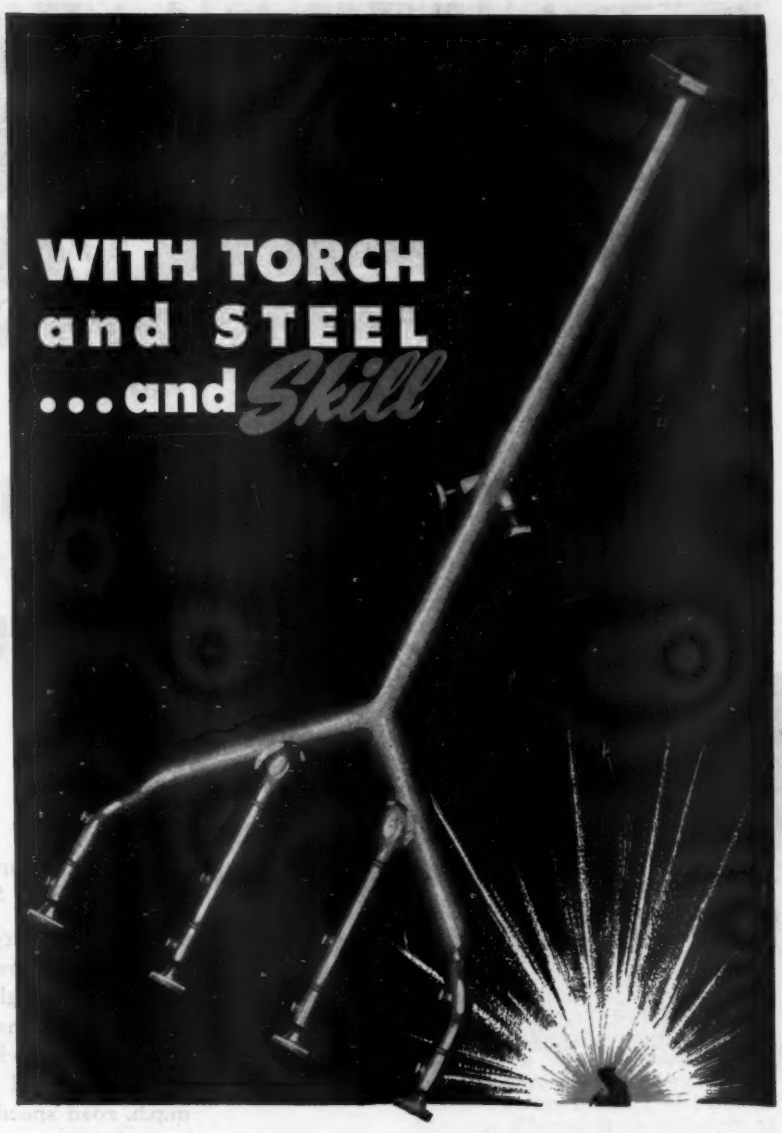
rig take care of themselves. Normally the barge will not have to be moved during the drilling of the wells comprising a group on a central location. This leaves only the derrick and actual rig to be skidded.

Structurally, Bayou Des Glaise is a shallow, piercement-type salt dome. The discovery well, located off the side of the dome, is producing from a deep flank sand at a depth of approximately 9,800 ft. Since development around salt domes of this type usually involves drilling of a relatively large number of wells, more closely spaced than in most other types of fields, the drilling of several wells from a single centrally located island fill makes possible substantial savings not only in the number of separate drilling sites that must be prepared and in the amount of dredging that must be done, but also in the time and difficulties involved in rig moves.

Access to the field for heavy traffic is by way of the Atchafalaya River, Whisky Bay Cut-off (a dredged flood-control channel), Bayou Des Glaise, and the field canal cut from Bayou Des Glaise, a total water-route trip of approximately 20 miles. Barge docks and wharfs are located on the Atchafalaya River at Krotz Springs, about 40 miles west of Baton Rouge on the Opelousas highway. Light traffic and personnel entrance to the field is by way of an old abandoned railroad track from a station about 5½ miles by road from Maringouin, a small town about 35 miles west and south of Baton Rouge where the company maintains field headquarters.

For transportation on the rail line, a number of "home-made" motor cars, driven by gasoline engines taken from old automobiles, have been provided. (See page 47, this issue.) One uses an old one-cylinder gasoline engine. The cars for personnel use are enclosed with housing of plywood construction. The rail line extends about 8 miles through the heavily wooded swamp to a boat landing on Whiskey Bay Cut-off, from where the remainder of the trip is made by boat down the cut-off channel, and thence through Bayou Des Glaise to the field canal, a distance of about 8 miles.

There are no roads of any kind through the area, and the only high ground is the dirt dump on which the abandoned rail line is laid. It is proposed to build a road, however, which would extend from the field a distance of approximately 6½ miles to the east levee of the Atchafalaya River basin where the nearest present road is located. The proposed road would require a dump about 7 ft. high to place it above the normal high-water level, and also several long trestles.



One of the important factors in the development of modern science and industry is industrial piping. Keeping pace with the conceptions and requirements of engineering has been the responsibility of fabricators. Since pipe fabrication is our business, we of Associated have constantly studied and striven in the improvement of techniques and procedures. With torch, steel and skill, and use of finest equipment this firm goes forward... We would like to help with your piping requirements.

ASSOCIATED PIPING & ENGINEERING CO., Inc.
2332 East 38th Street • Los Angeles 11, California

ASSOCIATED Progressive PIPING

Stormy Weather Won't Tie-up Your Well Servicing

ALLIS-CHALMERS Model E WINCH TRACTOR

Top Photo: Allis-Chalmers Model E Single Drum Winch Tractor. Bottom Photo: Allis-Chalmers Model E Double Drum Winch Tractor with Spudding Equipment and Two Pole Mast.

The Allis-Chalmers Model E Tractor has a Maximum Line Pull of 58,970 lbs. Front Drum Capacity 9,741' of ½" line. Rear Drum Capacity 7,330' of ½" line. Engine is 4 cylinder slow speed, heavy duty tractor type, developing 400 ft. lbs. torque. Available to burn Butane, Natural Gas, Gasoline or Distillate.

- - if your pumping leases are serviced with Allis-Chalmers Well Servicing Units.

These fast, rugged winch tractors are built to operate, easily, in any weather that a crew can take. The unit is thoroughly protected and equipped with weather proof magneto and large, low pressure pneumatic tires provide traction for mud, snow and all kinds of ground conditions. Available with 15 or 30 m.p.h. road speeds, little time is spent getting to the well or back to the garage.

●

Every unit has 8 line speeds available, instantly, on the winch drum. No need to take chances with men or equipment — there's a speed suitable for any operation condition. And Cooper patented Circulating Air Cooled brakes give positive control of the load.

A Cooper service engineer will be glad to discuss your servicing requirements with you and make a recommendation backed by our experience in supplying a majority of the country's mobile servicing Units.

FRED E. Cooper

Hulen Station, TULSA, OKLAHOMA

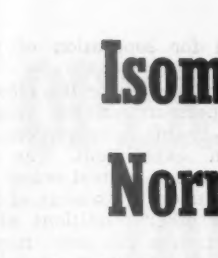
Isomerization of Normal Heptene

*by A. D. Petrov and V. I. Shchukin**

ABSTRACT

Using phosphoric acid as catalyst, these authors were able to isomerize two straight-chain olefins to isoolefins, and to determine differences in behavior of olefins of even and of odd numbers of carbon atoms. As a result they reached the following conclusions: 1. Isomerization of normal 1-heptene to methyldiethylethylene and of normal 1-octene to dimethylbutylethylene was established. 2. The difference in the schemes of isomerization of normal olefins into branched chain olefins observed in hydrocarbons with even numbers of carbon atoms as compared to those with odd numbers of carbon atoms was determined by chemical methods as well as by Raman spectroscopy.

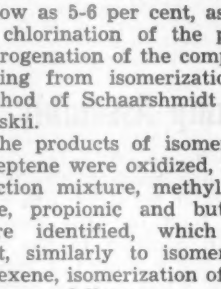
IN a previous communication[1] catalytic isomerization of normal 1-hexene to dimethylethylethylene was reported, apparently occurring as follows:



(1)

In the present study of isomerization of normal heptene and normal octene, high yields of branched-chain hydrocarbons were not aimed at. On the contrary, since it was attempted to establish as far as possible the initial stages of the isomerization and to reduce the yield of byproducts resulting from polymerization, the authors attempted to limit the isomerization to an extent as low as 5-6 per cent, as indicated by chlorination of the product of hydrogenation of the compounds resulting from isomerization by the method of Schaarshmidt and Moldavskii.

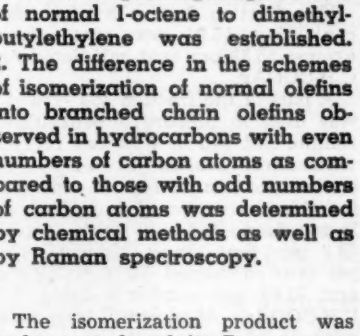
The products of isomerization of 1-heptene were oxidized, and in the reaction mixture, methyl ethyl ketone, propionic and butyric acids were identified, which indicated that, similarly to isomerization of 1-hexene, isomerization of 1-heptene occurs as follows:



(2)

The isomerization product was hydrogenated and its Raman spectrum investigated which established the presence of 3-methylhexane and the absence of 2-methylhexane.†

The product of isomerization of normal octene was also oxidized and this yielded acetone, butyric and valeric acids. Consequently, isomerization of normal octene proceeds as follows:



(3)

The above-mentioned results point to a similarity of (1) and (3) (hydrocarbons with even numbers of carbon atoms in the molecule), which led to formation of 2-methyl-2-alkenes, while heptene produced 3-methyl-3-hexene.

It is interesting to note that in a recent study of cracking isomerization of normal octene over an aluminosilicate catalyst by Egloff and coworkers[2] a more complex mixture of isooctenes was obtained. Investigation of the products of hydrogenation led to identification of 2-methylheptene, 3-methylheptene, 4-methylheptene and 2,3,4-trimethylpentene. Apparently, secondary isomerization reactions took place (rearrangement of 2-methylheptene into 3-methylheptene and into 4-methylheptene), as well as formation of branched-chain hydrocarbons by polymerization of products of cracking of the original hydrocarbon to di and trisubstituted alkenes.

Experimental Part

Isomerization of normal heptene.—Normal heptyl alcohol boiling at 172°-176° C. and obtained by hydrogenation of oenanthal was dehydrated over alumina at 350°-375° C. From 600 g. of the charge 370 g. olefin were obtained with boiling point 93°-95° C. Ten grams of the olefin were hydrogenated over nickel according to Sabatier. After the product of hydrogenation was treated with sulfuric acid, it was chlorinated with antimony pentachloride according to Schaarschmidt-Moldavskii.[3] The chlorination affected about 6 per cent of the hydrocarbons, which may be ascribed to isomerization resulting from the preceding operations, as well as partial chlorination of normal heptene, which seems to the authors to be more probable.

Oxidation of 10 g. of the olefin with potassium permanganate yielded a mixture in which no neutral substances were found, which could indicate the presence of side chains at the carbon atoms connected by multiple bonds. This fact justified carrying on the isomerization of initial heptene until hydrocarbons of the last-mentionel type were formed.

Isomerization of 300 g. of the heptene was effected in an autoclave of 2 liters' capacity at 325°-350° C., maximum pressure of 75 atm. and a contact period of 5 hours. In each experiment 100 g. hydrocarbon were used and 75 g. phosphoric acid on pumice. Unlike previous experiments with hexene, the catalyst was kept in the upper part of the autoclave in a beaker made of copper gauze. The product of isomerization obtained, which contained no gaseous products, was fractionated:

Fraction 1	up to 70°	15 g.
Fraction 2	85°-90°	40 g.
Fraction 3	94°-96°	125 g.
Residue and losses		125 g.

A part of the fraction 85°-90° was hydrogenated and then analyzed for branched-chain hydrocarbons according to Schaarschmidt-Moldavskii. The chlorination affected in this case 11 per cent of the hydrocarbons, which indicated a 5 per cent increase of the content of

*Laboratory of Organic Chemistry, Gor'kii State University. Translated by J. G. Tolpin, Universal Oil Products Co., Chicago, from Zhurnal Obshchei Khimii (Journal of General Chemistry) Vol. 11, pp. 1092-1095, 1941.

This is a part of the program of translations from the Russian scientific literature sponsored by the Petroleum Division of the American Chemical Society. The facts and opinions presented in this article are solely those of the authors cited. Neither Universal Oil Products Co. nor the Petroleum Division of the American Chemical Society necessarily endorse the statements made.

†The analysis was carried out for the authors by P. A. Bazhulin in the Laboratory of G. S. Landsberg at the Physical Institute of the Academy of Sciences U.S.S.R.

branched-chain hydrocarbons in comparison with the blank test. In the experiments with hexene, which were carried out under somewhat different conditions, the yield of branched-chain hydrocarbons was considerably higher.

Oxidation of the fraction 85°-90° was performed in a 1-liter flask into which 700 g. water, 10 g. magnesium sulfate and 30 g. of the fraction 85°-90° were charged and 84 g. potassium permanganate added in portions. The oxidation was continued with shaking for 12 hours. The neutral products of oxidation were distilled off with steam. The oil was removed from the surface of the reaction mixture, dried and distilled. A total of 7.3 g. product was obtained consisting (basically) of unchanged hydrocarbon fraction 85°-90° C. The distillate was saturated with potash, the oil floating on the surface, 2.7 g., separated, dried and distilled. It went over for the most part at 75°-83° C. and gave the iodoform reaction for ketones. Its semicarbazone crystallized from water in the form of needles with m.p. 137° C., as compared to the m.p. of 135°-136° C. reported for the semicarbazone of methyl ethyl ketone[4]. Analysis—Found: N, 32.9 per cent; calculated for $C_5H_{11}ON_3$: N, 32.6 per cent.

The acid products resulting from oxidation were analyzed after the manganese oxides were filtered off and washed with water, and the filtrate and the wash water treated with a small amount of potassium bicarbonate and evaporated to dryness. The residue was treated with dilute sulfuric acid under cooling, the oily layer of the mixture separated and the residue again acidified with sulfuric acid and extracted with ether. A total of 6.8 g. acid products were obtained, which were dried in a desiccator and distilled:

Fraction 1	up to 135°	1.8 g.
Fraction 2	135°-145°	2.3 g.
Fraction 3	145°-171°	2.7 g.

The fraction 2 gave a silver salt containing 59.91 per cent silver, against calculated for C_3H_5COOAg, 59.66 per cent, and the fraction 3 a salt containing 56.12 per cent silver, against calculated for C_5H_7COOAg, 55.38 per cent silver. A part of the fraction 135°-145° C. was converted into a benzylthiuronium salt[5] which melted after three recrystallizations at 146.3° C., against the reported[6] m.p. of this salt of 148° C.

Isomerization of normal octene.—A 755-g. batch of normal octene (mixture of 1-octene and 2-octene) was prepared by dehydration of secondary octyl alcohol over alumina at 350°-375° C. The analysis of the product before and after isomerization and isomerization over phosphoric acid were carried out under the same conditions as applied to normal heptene. The increase in the content of branched-chain hydrocarbons in comparison with the blank test amounted to 5.6 per cent. The product of isomerization gave upon distillation the following fractions:

Fraction 1	up to 100°	30 g.
Fraction 2	100°-110°	10 g.
Fraction 3	110°-113°	46 g.
Fraction 4	113°-117°	130 g.
Fraction 5	117°-125°	50 g.
Residue and losses		144 g.

A 30-g. portion of the fraction 113°-117° C. was oxidized under conditions described above. From the neutral products a semicarbazone was isolated melting at 187° C., as compared to the m.p. of 190° C. reported for the semicarbazone of acetone[6]. Its analysis indicated 37.05 per cent nitrogen, against 36.52 per cent calculated for $C_4H_9ON_3$.

The acid products of oxidation were fractionated:

Fraction 1	up to 150°	2 g.
Fraction 2	150°-156°	3 g.
Fraction 3	156°-165°	3 g.

The fraction 2 gave a silver salt containing 55.01 per cent silver, against 55.38 per cent calculated for C_3H_7COOAg.

A part of the fraction 150°-156° C. was used to prepare a benzylthiuronium salt which, after two recrystallizations, melted at 143.3° C., against the m.p. of 146° C. reported[5] for this derivative of butyric acid. It was found by analysis to contain 53.8 per cent silver, against 55.38 per cent calculated for C_3H_7COOAg and 51.67 per cent calculated for C_4H_9COOAg. Apparently it was a mixture of silver salts of butyric and valeric acids. The sample was too small for separation of these parts.

In order to evaluate the effect of elevated pressure on the yield of branched-chain hydrocarbons, an orientation experiment was performed in which normal octene was isomerized under a pressure of 2,000 atm.* The other conditions of the experiment were the same, namely, a temperature of 350° C., phosphoric acid catalyst, duration of the experiment 4 hours. A 30-g. sample of the initial octene boiling at 121°-125° C. gave 6 g. of a fraction boiling at 115°-121° C. After hydrogenation of this fraction, its analysis by the Schaarschmidt-Moldavskii method indicated an increase of branched-chain hydrocarbons of only 3 per cent over their content after a blank test. Thus, the rise of pressure from 75 to 2,000 atm. does not increase the yield of branched-chain hydrocarbons.

References

1. A. A. Petrov and V. I. Shchukin, Zhurnal Obshchei Khimii (J. Gen. Chem.) 9, 506, 1939—Survey For. Petrol. Liter. 209.
2. G. Egloff, J. Morrell, C. L. Thomas and H. Bloch, J. Am. Chem. Soc. 61, 3571, 1939.
3. B L. Moldavskii and S. E. Livshits, Zhurnal Obshchei Khimii (J. Gen. Chem.) 5, 422, 1935.—Survey For. Petrol. Liter. S-9.
4. Pickard and Kenyon, J. Chem. Soc. 1936, 103.
5. Donleavy, J. Am. Chem. Soc. 58, 1004, 1936.
6. Ciamician and Silber, Ber. 48, 186, 1915.

*The authors are indebted to O. I. Leipunskii, in whose laboratory at the Institute of Chemical Physics in Leningrad this experiment was performed.

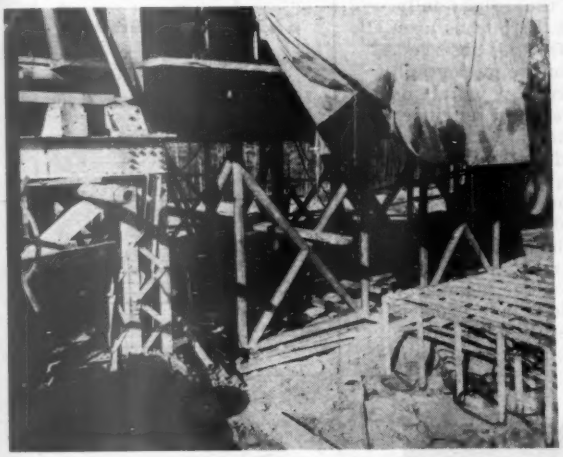
Unitized Boiler Feed-Water Pump Assembly

TRENDS in drilling rig assemblies are toward greater unitization and compactness of equipment, minimizing the amount of tearing down and reassembling that must be done in moves. Representative of this is the boiler feed water pump unit shown in the accompanying picture. Skids of this unit are constructed of piping, which also serves for steam and water line headers. The automatic lubricator for steam line connections is built into the base of the skid. In addition to the two boiler feed water pumps, a generator unit and a tool box are permanently mounted on the skid. All fittings are permanent.

OPERATING IDEAS

Dual Substructure Units Designed for Drilling-Rig Engine Foundation

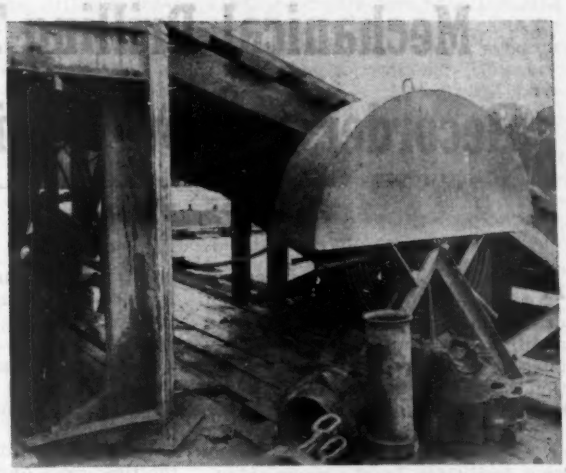
IN lieu of a standard engine-floor substructure which was not readily available at the time, a drilling contractor operating in Mississippi designed one of his own and had it fabricated from discarded pipe as shown in the accompanying picture. The substructure consists of two identical sections, each a separate unit during moves. These are set up in parallel, one behind the other with length extending the width of the derrick



substructure, providing extra wide floor space around the sides of the engines. In this setup, vibration also is minimized. The units are of welded construction with main members and legs fabricated from 4-in. pipe and secondary members and bracing of smaller sized pipe. Of comparatively light weight and in two sections, the structure is easily moved. Dimensions of each unit come well within road and trucking limitations.

Reel for Drilling-Line Dead End Fabricated From Discarded Metal

FOR the sake of shifting the point of wear in the blocks and thus getting longer safe service from the line, good practice now demands that the drilling line occasionally be pulled over a short length, about 100 to 150 ft., or more depending on the number of lines strung and other factors. The line in many cases in the past has been cut off the dead end and discarded, but now with so many uses for old line it usually is spooled as pulled over, and salvaged. For this a regular wire-line spool may be and frequently is used. However, because such a spool may be awkward to handle, and subject to damage, the operator of the rig shown in the accompanying picture has fabri-



cated a special reel for this purpose. Constructed of discarded pieces of angle iron and small pipe and rods, as shown, the reel is substantial, but light. The reel with its supporting axle and skid base upon which it is mounted comprises a unit which is easily picked up and moved. The sheet-metal hood protects the spooled line from the weather. The dead line, under stress, is looped under the derrick sill to which it is anchored.

Efficient and Economical Mud System Uses V-Shaped Trenches

THE illustration shows a mechanical rig engaged on 7,000-ft. field development drilling work, which uses simple V-shaped mud-circulation trenches, with shale and reserve pits placed on one side of the V. Mud returns from the rotary screen enter at the upper right-hand arm of the V, and at a point about 10 ft. from the near end (in the photograph) pass through

a trench connecting to the left-hand arm. The pump suction line is shown at upper left. Position of jetting guns is along right arm of the V, adjacent to the cuttings and reserve pits. The earth from the V trench has been pushed by the bulldozer which did the digging toward the foreground of the photograph, and a mound built which serves as the base for a 1,000-bbl. water tank. The view was taken from the top of the tank.

Mechanical Drilling-Time Recorder Improves Efficiency

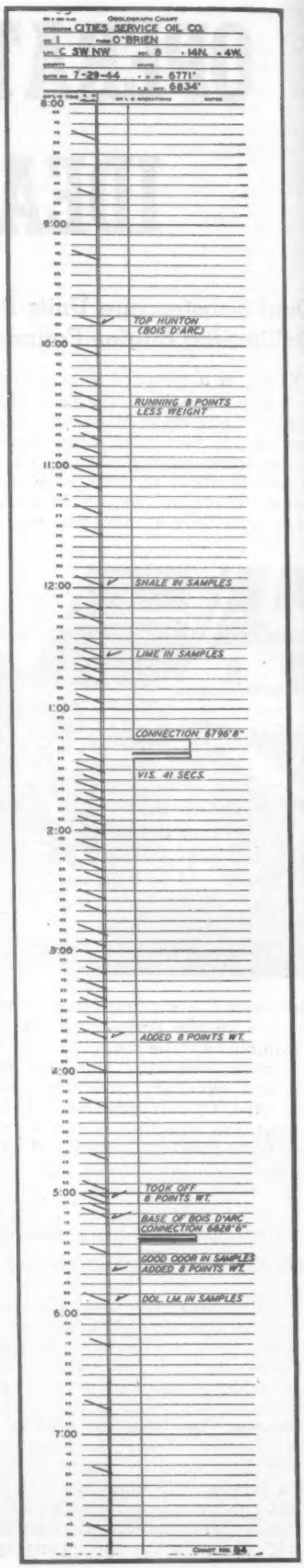
by Paul Reed

ACCURATE drilling-time records are increasing the efficiency of drilling and completion operations in addition to serving their primary purpose of aiding in the identification of producing zones which might be readily overlooked.

Within recent months wider use of complete drilling-time data has been facilitated by the more extensive utilization of geolographs in the Mid-Continent and Gulf Coast areas. A geolograph is a mechanical device for recording drilling and coring time of rotary wells in terms of minutes per foot. Although installed at widely scattered locations the distribution is still limited to less than 50 units because of the shortage of materials.

The recording instrument itself of a geolograph installation may be placed at any point that is convenient such as a location near the draw works, in the doghouse or at a short distance from the derrick in the geologist's shack or trailer. The recording is done automatically and continuously on a strip chart similar in size and shape to a geologist's log. This geolograph chart or log is marked to indicate 5-minute intervals in a 12-hour period; this chart is turned on a drum operated by a clock mechanism. Two parallel records are kept on the geolograph chart, one by a pen which makes a mark at an angle to the left each time a foot has been drilled; the other makes a mark at right angle to the right side whenever the bit is raised off bottom. By referring to the time scale on the geolograph log it is possible to tell how long it took to drill each foot and the time of day that each foot was dug. A meter on the geolograph shows the depth at all times. A running check is maintained with the pipe tally. When and how long the bit has been off bottom can also be observed. Space is provided on the geolograph chart or log for recording notations by driller, geologist and engineer regarding weight, mud, formations, etc. Since the rate of drilling quickly reflects changes in the nature of formations, this chart is useful as a continuous log made automatically while the well is being drilled which gives many data in more detail than can be obtained by other means. A graphic record is also made of such items of drilling operations as round trips, connections and shutdown time.

Geolograph for recording drilling time installed near draw works



From a distance a rotary rig equipped with a geolograph may be identified by a peculiar elongated weight suspended from a cable which looks like a guy line.

A geolograph is operated by a flexible wire line of a kind known as shooter's cable or torpedo line, one end of which is fastened to the gooseneck of the rotary swivel. From there it passes over a pulley at the crown block, down through the recording mechanism and back over a second pulley to the weight, previously mentioned, moving freely along a special guide cable from which it is suspended. This weight is sufficient to keep the cable taut at all times. As the drilling progresses, the movement of the kelly feeds the line through the mechanism where the direction of movement and the extent of penetration are recorded. After the geolograph cable has been fastened to the kelly, it is not necessary to disconnect it until drilling has been completed. It does not interfere with the drilling operations.

The geolograph, being an automatic mechanical device, eliminates chances for errors—due to the human element—occurring when drilling-time data may be observed and recorded by the driller himself.

The value of accurate drilling-time data in logging wells has been recognized long before the geolograph was developed. Relative, rather than specific, drilling speed reflects changes in the formations penetrated. Breaks in formations stand out prominently on a drilling-time chart under the various drilling situations affected by sharpness of the bit, the weight on the bit and condition of the mud, which affect specific drilling time. The natures of the formations determines the drilling characteristics. There are, of course, exceptions when drilling is done in a crooked hole.

Drilling contractors have installed geolographs in a number of cases for the purpose of maintaining a better control over operations. However, the majority of geolographs have been installed by specification of oil companies. The mechanically recorded drilling-time charts give an accurate record which can be conveniently read, giving details of operations on which the contractor is spending his money. These show the time consumed in trips, connections, repairs, etc. Stripping the kelly becomes unnecessary; tool-joint lubricant is saved; and a member of the crew is freed from stripping duty. There also may be benefits from better time of bit replacements.

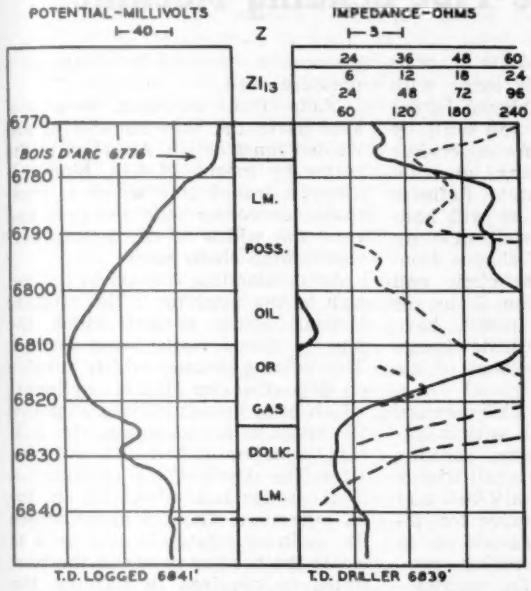
Aid to Driller

Drillers are relieved of the need of keeping in mind important formation changes when they have other demands on their attention. When a driller comes on tour he can tell at a glance the kind of formations drilled in previous tours.

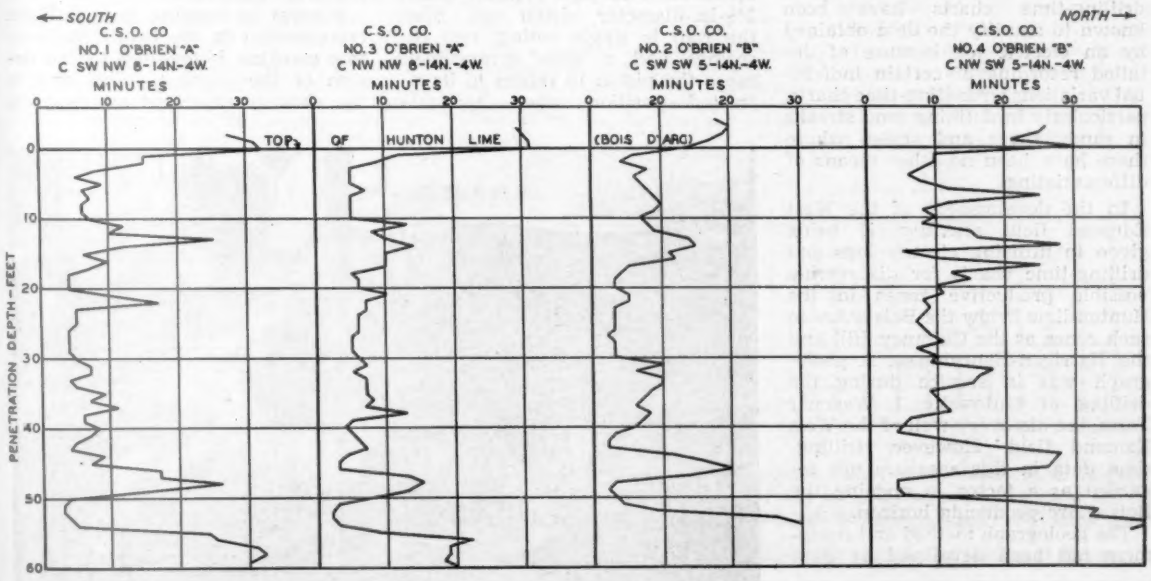
While shutting down and circulating because of mechanical trouble, drilling-time charts are useful since they graphically show upper formations. If at such shutdown periods the bit is drilling in shale, it may be advantageous to raise the bit to circulate in a harder zone so as to avoid washing out shale while circulating. In mud control the charts have been useful in furnishing a convenient place for recording notations regarding changes in viscosity and weight of the drilling mud.

For both contractors and oil companies the mechanically recorded drilling-time charts aid in settling accounts and for analyzing drilling costs.

Because a change in the rate of drilling will be revealed within a



Geolograph chart (on opposite page), electric log (above) top of the Hunton section of Cities Service Oil Co. 1 O'Brien, West Edmond field, Oklahoma; (below) drilling-time logs of four O'Brien wells for correlating soft zones in the Hunton lime



distance of a foot by the geolograph, the charts are an aid in logging cuttings at the break in formations. Another result is that the need for coring is frequently eliminated except where desired for laboratory analysis. Furthermore, better control is afforded in drill-stem tests; proper points for setting packers in these tests can be determined more accurately. After encountering a break in formations, the drilling-time chart frequently furnishes sufficient data to justify eliminating time spent to circulate for return of cuttings. Instead of circulating for return of cuttings a procedure may be followed for preparing for a drill-stem test. Chart data have aided in determining points where side wall coring should be done.

Details of formations recorded by drilling-time charts have been useful in the drilling of the West Edmond, Oklahoma, field where there is difficulty in recovering enough of the soft streaks in coring to be satisfactory. Consequently, the charts have aided in estimating producing thickness from an engineering standpoint and for reaching decisions on the setting of pipe and packers and for perforating.

Some companies are making a practice of having geolographs continue to function during the running of casing, cementing, and acidizing in order to obtain a convenient, consistent record throughout completion as well as drilling operations.

Since accurate drilling-time logging is fast and clean cut, it often helps in removing uncertainties in preparing logs based on drill cuttings. Geolograph charts have frequently aided in identifying sands and productive soft breaks which otherwise would have escaped notice.

After the well has been drilled, drilling-time charts have been known to amplify the data obtained by an electric log because of detailed recording of certain individual variations on drilling-time charts, particularly in defining sand streaks in sandy limes and shales where there have been no other means of differentiating.

In the development of the West Edmond field attention is being given to utilizing electric logs and drilling-time charts for discovering possible productive zones in the Hunton lime below the Bois d'Arc in such zones as the Chimney Hill and the Harrigan-Henryhouse. A geolograph was in service during the drilling of Gutowsky 1 Wagoner Farm, the discovery well of the West Edmond field. However, drilling-time data in this case are not regarded as a factor in opening the Bois d'Arc producing horizon.

The geolograph method and equipment has been developed by Paul B. Nichols, assistant district geologist, Cities Service Oil Co., Oklahoma City, who made the device available for more general use by the industry during the past year by leasing units through the Geolograph Co., Oklahoma City. The instrument is so new to the industry that in West Edmond where more instruments are in use than elsewhere it is still unknown to most of the drilling crews working there.

By recording data mechanically, the geolograph log aids in determining depths, for coring and drill-stem tests; correlation; definition of the actual top and thickness of producing horizons.

Problems of sample lag are eliminated by more reliable indication of the actual point of stratigraphic change. This is important in plug-back operations, perforating and shooting. Data on depth and thickness of upper sands and porous zones in limestones and dolomites are becoming more significant in connection with efforts to find productive flank, lenticular, and stratigraphic traps.

Versatile Pipe-Bending Machine

PIPE bends, formed to various shapes, are quickly made with the bending machine shown in the photograph. Designed and built by W. L. Pore, maintenance supervisor at the McPherson, Kans., plant of the National Cooperative Refiners Association, the machine will handle light and heavy-wall pipe up to 14 in. o.d. Various shapes from ordinary 90° bends to circle and double offset expansion loops, as well as short radius bends, have been formed with very little change in cross-sectional dimensions of the original pipe.

Designed for on-the-job operation the machine is powered with a single-cylinder portable-type gasoline motor which operates a small triplex plunger pump through a V-belt and geared speed reducer drive for developing hydraulic pressure up to 500 p.s.i. The single-acting ram, which is attached to the machine-base frame, is arranged for receiving forming shoes as required for the different pipe sizes. The ram, which has a stroke of about 16 in., is made up of an 8-in. pipe cylinder and a 2½-in.-diameter piston rod. Since the ram is single acting, two coil springs and a yoke arrangement cause the piston to return to its retracted position when hydraulic pressure is removed by means of a pressure vent.

Made from salvaged structural steel parts, the base frame is of all-welded construction. Attached to the frame by means of 4-in. pipe columns, a trolley rail, which is positioned on center with the ram and runs the width of the frame, carries a 5-ton chain hoist.

An outstanding feature in the design of the machine is the rotating bearing points against which the pipe is placed while being formed. The bearing points, which revolve on large-diameter pins, are cylinders which have been machined at points 90° apart to accommodate the outside diameters of four different pipe sizes. The depth of the circular cut in the roller runs about 1½ in. for all pipe sizes. The pin about which the cylinder rotates is also used to locate the bearing points in the base frame as required in forming the different radii bends. Bending loads have been greatly reduced, if not eliminated, on the locating pin by providing lever arms on the bearing-point assemblies.

Success in keeping near uniform cross-section in the bends made on this machine is credited to the design of the bearing points and to the shoe arrangement on the ram.

Application of Radial-Permeability Computations to Oil-Reservoir Problems

FORMERLY production in barrels could be plotted on cross-section paper, a decline curve drawn, and the future production of given months or years estimated by projecting the curve the desired distance. Now, in the period of prorated production, as long as oil "allowables" are not changed, the graph is a straight, horizontal line as long as the well will produce the amount of oil allowed. Such graphs are consequently of no aid. Future production of wells may be predicted, however, by using pressure-decline graphs, water or gas-cap-encroachment graphs, and the radial-permeability formula.

First, the type of reservoir* ought to be recognized. If the reservoir is of the gas-drive type, the flow of oil depends upon the rate of pressure decline. The pressure in pounds per square inch can be plotted on cross-section paper against time in months. A typical pressure decline graph is shown in Fig. 1. Then the pressure decline can be projected into the future and the pressure for any desired future period read from the graph, if the rate of withdrawals in the interim will be constant. Then the future capacity production of the well for the desired date, under certain conditions, may be calculated by means of the radial-permeability formula by substituting the pressure read from the curve at the desired time for P_2 in the formula and solving for Q, the rate of production. If the reservoir is a water-drive type and the field is being produced faster than the water is encroaching, so that a pressure decline is recorded, the pressure-decline graph may be plotted and the future production calculated by means of the radial-permeability formula exactly as described above for gas-drive reservoirs. Example, suppose an oil well is producing today under restricted flow. Its production capacity, Q, is 111.4 bbl. per hour; its radius, r_2, is 0.3 ft. Its drainage area, r_1, is 500 ft.; its permeability, K, is 1 darcy; and the sand thickness, t, is 306 cm. The reservoir pressure, P_1, is 87 atm.; and the flowing pressure, P_2, is 68 atm. What will be the producing capacity 1 year from today if the reservoir pressure has dropped to 77 atm. and all other factors remain the same.†

Today,

$$Q = \frac{K \cdot 2\pi t (P_1 - P_2)}{\mu \cdot \log_e (r_1/r_2)}$$

$$= \frac{1 \times 2 \times 3.1416 \times 306 \cdot (87 - 68)}{1 \times \log_e 500/0.3}$$

$$= \frac{36{,}530.52}{7.42} = 4.92 \text{ liters per second}$$

or 111.4 bbl. per hour.

One year hence,

$$Q = \frac{1 \cdot 2\pi t (P_1 - P_2)}{\mu \cdot \log_e (r_1/r_2)}$$

$$= \frac{1 \times 2 \times 3.1416 \times 306 \times (77 - 68)}{1 \times \log_e 500/0.3}$$

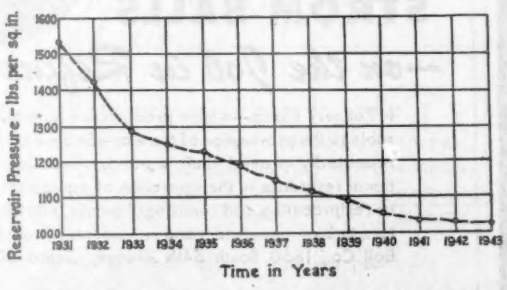
= 2.33 liters per second or 52.76 bbl. per hour.

If the well or lease under consideration is located near the lower edge of the field and there is danger of water encroachment, then a graph should be prepared showing annual rate of water encroachment (Fig. 2). In this graph the distance of encroachment of the water is plotted against time in years. By projecting the curve, the time required for the water front to reach the well is estimated, provided the rate of withdrawal of fluid from the reservoir is kept constant. If it is found from the water-encroachment graph that water will reach the well before the end of the time at which the well productivity is desired, then the calculations made by the above method will hold only as long as the well is not making water.

Predictions of future production from present records of performance are dependent upon uniform conditions, which permit projecting pressure-decline graphs and upon having an unsaturated oil, where free gas is not liberated in the formation. If "allowables" are increased in water-drive reservoirs, if gas comes out of solution from the oil while in the formation, or repressuring operations are instituted in gas-drive reservoirs, then, of course, the effect of such changes has to be accounted for in the final estimates. In the case of changing production rates, it is possible to prepare a series of pressure-decline curves to account for several different production rates so that one may estimate future production on a basis rate of withdrawal.

*Reservoir types are described in Engineering Fundamentals No. 161, "Effect of Natural Forces on Oil Production," in the issue of November 25, 1944.

†For a detailed explanation of means of computing this formula, see Engineering Fundamentals No. 167, "Application of Permeability and Viscosity Measurements to Oil-Reservoir Studies," January 6, 1945.



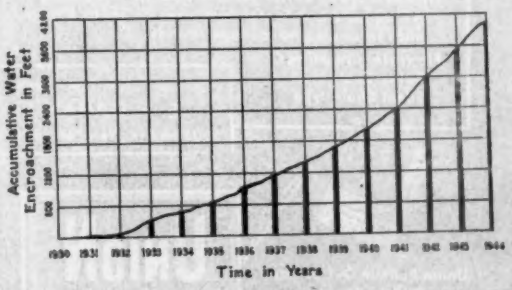
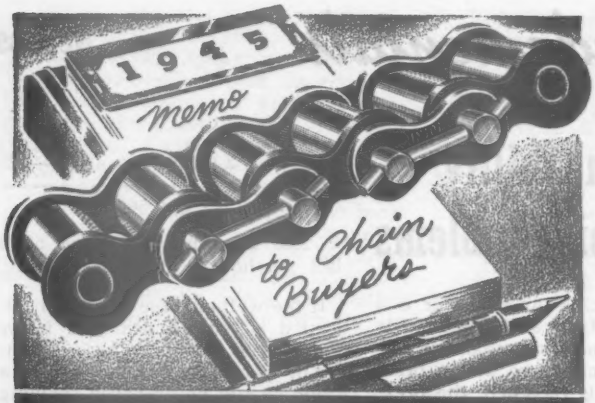


Fig. 1: (Left) Typical pressure-decline curve of a water-drive field. Similar conditions exist in East Texas. Fig. 2: (Right) Graph illustrating encroachment of water into a lease on the edge of an oil field during a period of years. Note that the rate of encroachment in this case is about 300 ft. per year during early life of field, but increases to nearly 600 ft. in latter life

Series prepared by F. B. Plummer, professor, petroleum engineering school, University of Texas



A Good Year To Buy Union Chain

☆ Because this year will bring peace much nearer, if not actually realized, and our thinking will turn more toward the production of oil for peacetime requirements. The same Union Chains which are being assembled as integral parts of war machines will be ready to perform the important task of power transmission on increasing numbers of drilling rigs throughout the oil country. Every year is a good year to buy Union because Union Oil Field Chains and the organization which makes them have a reputation with Oil Field Chain buyers for "wearing well".

The Union Chain and Manufacturing Company
Sandusky, Ohio, U. S. A.

Union Oil Field Chain for Every Application

A. P. I. No. 3¼ P Union *Superintendent* No. 3125-R
A. P. I. No. 3⅛ P Union *Superintendent* No. D-3125-R
A. P. I. No. 4 P Union *Jumbo* No. 1240-SXX
A. P. I. No. 4 P Union *Toolpusher* No. 1240-RXX
A. P. I. No. 4 P Union *Driller* No. 1240-R 4
A. P. I. No. 4 C Union *Roughneck* No. 1240-RX
A. P. I. No. 3 P Union *Toolpusher* No. 1190-RXX
A. P. I. No. 3 P Union *Driller* No. 1190-R 3
A. P. I. No. 3 C Union *Roughneck* No. 1190-RXS

★

Finished Steel Roller Chains and Sprockets
All manufacturer's standard sizes ⅜ in. to 2½ in. pitch in single and multiple strands.

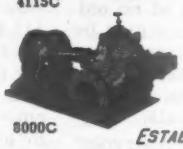
Flexible Couplings
Roller Chain type
Silent Chain type

Oil Field Chain Export Sales
E. F. GAHAN
500 Fifth Ave., New York 18, N. Y.

Union Bulletin O-1 covers Oilfield Chain. Ask for your copy.

UNION CHAINS

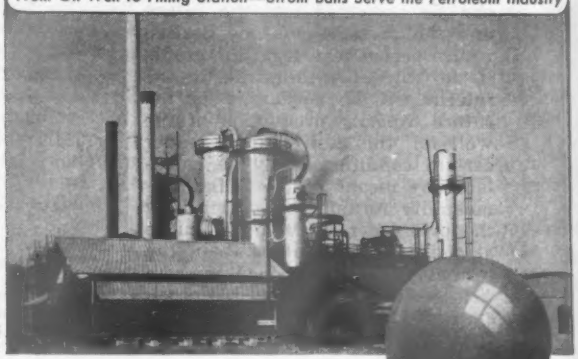
PUMPS
CENTRIFUGAL
RECIPROCATING



ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.
INDIANAPOLIS IND.
323 W TENTH ST.

From Oil Well to Filling Station—Strom Balls Serve the Petroleum Industry



STROM BALLS
—on the Job in Refineries

In Refinery Plants—whose products are so indispensable to the prosecution of the war—Strom Balls have repeatedly proved their worth by reducing frictional resistance in the operation of equipment such as reciprocating and centrifugal pumps, electric motors, turbine-generators and instruments. Strom Steel Ball Co., 1850 South 54th Avenue, Cicero 50, Ill.

Strom BALLS Serve Industry

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Crude Evaporation Losses

THE loss of crude oil as a vapor from storage is dependent on the following main factors:

1. Vapor pressure or tendency to evaporate.
2. Temperature—vapor pressure increases rapidly with temperature.
3. Variation of temperature—expansion and contraction force vapor through the relief vents.
4. White paint or insulation reduces maximum temperature in tanks.
5. Kind of tank—fixed, flexible or balloon roofs. Also floating roofs and water displacement tanks which have no vapor space.
6. Filling frequency — complete filling displaces one full tank of vapor.
7. Windage provides fresh air to be saturated with oil vapor.

TABLE 1—TOTAL EVAPORATION LOSS FROM CRUDE-OIL STORAGE TANKS

Tank data		Total evaporation loss, in 42-gal. barrels							
		Gas-tight fixed-roof		Wiggins breather roof		Wiggins balloon roof		Wiggins pontoon roof	
Capacity in bbl. (42 U. S. gal.)	Diameter in feet	One filling	Annual breathing	One filling	Annual breathing	One filling	Annual breathing	One filling	Annual breathing
10,000	42.5	10	150	...	...	9	0	0	42
20,000	60.0	20	290	20	140	18	0	0	80
30,000	73.5	30	420	30	186	27	0	0	114
40,000	85.0	40	540	40	220	36	0	0	140
50,000	95.0	50	650	50	230	45	0	0	160
60,000	104.0	60	750	60	240	54	0	0	180
70,000	112.5	70	840	70	245	63	0	0	196
80,000	120.0	80	920	80	240	72	0	0	208
100,000	134.0	100	1,100	100	200	90	0	0	250

One filling = one complete filling.

Vapor pressure affects tank losses only because it affects the saturation of the vapor. Thus, if the oil has a high vapor pressure (10-14 lb.) the vapor above the oil will be nearly 100 per cent pure, whereas the vapor space above a low-vapor-pressure oil will be filled with air or a very dilute vapor.

Temperature changes cause the vapor mixture to expand or contract and the tank breathes oil vapor out upon expansion and breathes fresh air in when it cools. Increasing temperature also increases the vapor pressure causing the vapor vented from the tank to be more highly saturated with hydrocarbons and vice versa.

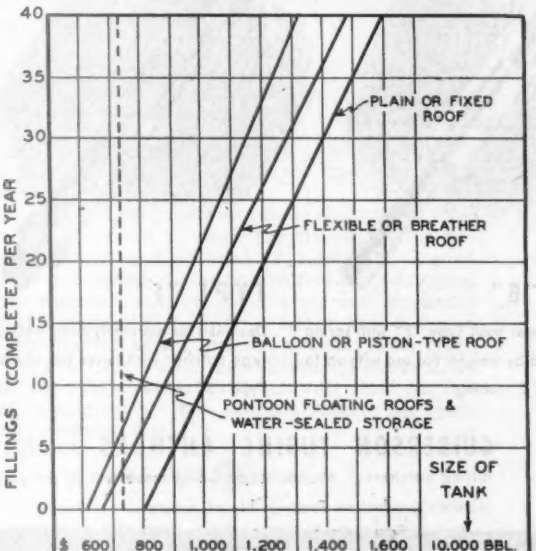


Fig. 1: **Crude storage costs per year**

Kind of tank.—Fixed-roof tanks cannot change in volume and hence breathing and filling losses are great. Flexible roofs, balloon roofs, or chambers and gas holders connected to the tanks permit some expansion and contraction and thus may eliminate some or all losses depending on the completeness of the setup. Completely sealed storage such as pontoon floating roofs and water displacement tanks may eliminate nearly all losses including filling losses. Chicago Bridge & Iron Co. compares losses and costs of welded storage. (Table 1.)

Yearly costs* of crude-oil storage are shown in Fig. 1. It is used by estimating or counting the number of times the tank is filled per year. Read across the figures to the kind of tank that is installed or being considered and read the yearly cost on the proper scale at the bottom. Thus at 10 fillings per year, the storage of 50,000 bbl. in a fixed-roof tank will cost about $4,000 (center scale) per year. Furthermore, storage of 50,000 bbl. of crude in a floating-roof tank would cost only $2,600 per year.

*"Yearly costs" include cost of tank per barrel of storage amortized in 10 years, maintenance, volumetric evaporation loss and loss in value of oil due to decrease in gravity.

No. 2A in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

Note: This installment and these data replace No. 2 published in the issue of July 29, 1944

On Guard

10,000 FEET DOWN!

GUIBERSON tubing catchers are on the job 24 hours a day instantly alert to grab a section of parted tubing or to stop the tubing from dropping when an accident occurs. Quick acting compression springs retard the fall and slips, actuated by weight, drive wedges that instantly grip casing walls. Stops dropping tubing in three inches. All Guiberson tubing catchers are positive acting with large slip area. Give largest fluid and gas by-pass area. Short and compact in design with minimum moving parts. Made of steel throughout with slips of precision machined alloy steel. Guiberson tubing catchers keep an unseen guard on the job to save time and money when an accident occurs.

TYPE "E"

Designed for use in wells carrying up to 11,000 ft. of 2" tubing or 8,000 ft. of 2½" tubing.

Type "E" Tubing Catcher with Anchor

TYPE "B"

Slightly smaller than Type "E" with spring not enclosed by weight. For use with up to 7,200 ft. of 2" tubing.

TYPE "F"

Designed for extremely deep wells. Duplex type catcher with twice the slip area of Type "B" catcher.

GUIBERSON TUBING ANCHORS Available for all tubing catchers. Anchor stops tubing movement in pumping. Helps increase production. Prolongs life of tubing.

BETTER BE SAFE THAN SORRY GUIBERSON

Guiberson U.S.A. *Established 1919*

THE GUIBERSON CORPORATION, DALLAS, TEXAS, U.S.A.

Export Representative: I. FRANK BROWN ... 30 ROCKEFELLER PLAZA, NEW YORK, NEW YORK

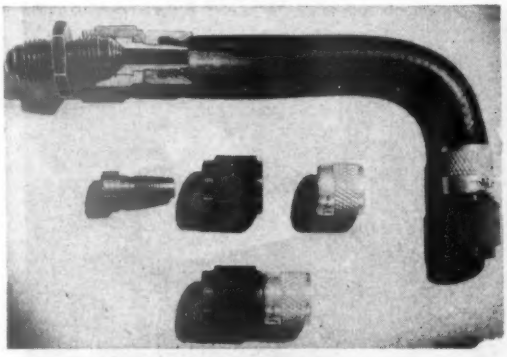
California Distributor: W. R. GUIBERSON CO. ... 723 EAST GAGE AVE., LOS ANGELES, CALIF.

OIL AND GAS EQUIPMENT Digest — IT'S NEW CHECK IT

by Kenneth B. Barnes

(1) FLEXIBLE CONNECTIONS. Some installations of flexible connections are regarded by engineers as a necessary evil due to chances for failure, and when cases requiring quick replacements come up, because of the difficulty of obtaining correct lengths for specific installations. Aeroquip hose lines were originally developed for airplanes, and the design is such that complete tailor-made assemblies can be made on the job by untrained personnel.

The equipment has been used with many fluids, principally gasoline, lubricating oil, water

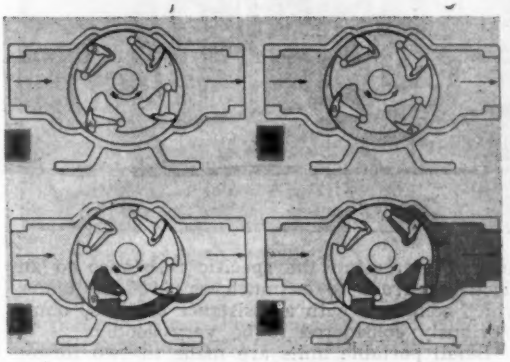


and glycol at temperatures from —65° to 300° F., and both mineral and vegetable base hydraulic fluids.

A typical Aeroquip hose line is illustrated, with one end sectioned to show the nature of the reusable fittings and method of assembly. One of the special fittings made is a self-sealing coupling which makes it possible to separate and reconnect any liquid-filled line without either loss of liquid or introduction of air into the system. Hose types for service from vacuum conditions to above 1,500 p.s.i. are available. A small assembly tool kit has been designed by the manufacturer. *Aeroquip Corp., Jackson, Mich.*

IT'S NEW CHECK IT

(2) BUCKET DESIGN ROTARY PUMPS. New problems constantly arising through the bane of corrosion focus attention to the Blackmer rotary



pumps, which use the bucket design or swinging-vane rotor arrangement to automatically compensate for wear and maintain volumetric efficiency. Operating principle is illustrated here, with suction flooded and the rotor making a "first revolution."

A bulletin is available which compares the new relief valve performance with conventional types; it shows removable liner (corrosion resistant) installations, pumps with steam-jacketed heads, multiple units, single and double reduction drives, operating curves and other items. *Blackmer Pump Co., Grand Rapids, Mich.*

IT'S NEW CHECK IT

(3) WATER DEMINERALIZER. Ordinary water is transformed into the chemical equivalent of distilled water in the Filt-R-Stil, which utilizes melamine-derived and other resins in the process. Principle of operation consists of passing the raw water through beds of ion exchange resins, which transform the dissolved salts in the water to the corresponding acids, and in turn absorb the acids.

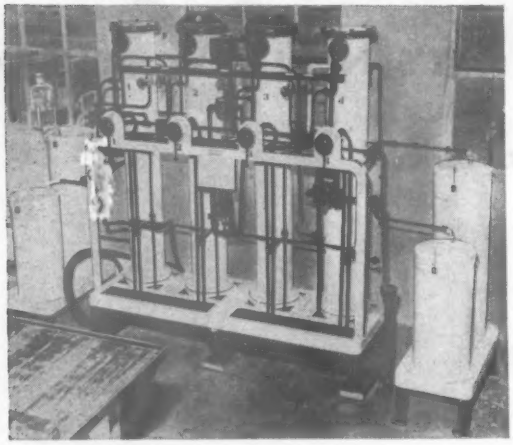
The process may be visualized by picturing water as containing flowing metals which are attracted by a magnet except that the magnet, in this case, is chemical rather than electrical. The final demineralized water has an average salt content as low as 2 p.p.m. (as Ca CO_3) and the process also removes dissolved CO_2 from the water. Water has been cleaned of its minerals to the ex-

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

Keep Informed. Save Time. Tear Out Card. Check It. Mail It.

OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

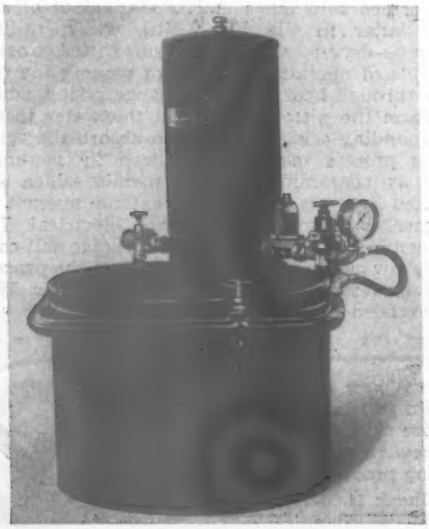


tent of increasing the specific resistance to an electric current to as much as 6,000,000 ohms, which compares with a resistance of 50,000 ohms previously considered to be very good.

Small portable units are made in two forms, one for field and the other for bench use. Special sizes are made for large industrial application. Equipment is provided for the reactivation of the ion exchange resins, and electronic controls are incorporated. *American Cyanamid & Chemical Corp., New York, N. Y.*

IT'S NEW CHECK IT

(4) PAINT-MASTIC SPRAYER. For air-spray application of paints, sealers, and mastics the "Versatal" material pumps are a radical departure from the conventional type of pressure pot spray apparatus. They eliminate necessity of maintaining an air head in the material container. This makes it possible to reload the container while operations continue uninterrupted.



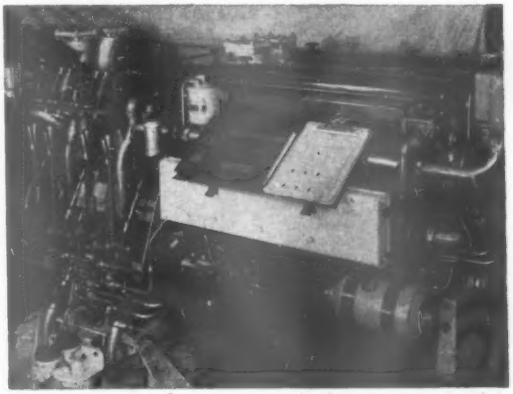
An automatic agitator is provided. The material is delivered from the pump at pressures 4½ to 5½ times the introduced pressure. Material can be supplied through several hundred feet of hose for handling difficult-to-reach locations.

Bulletin is available showing use in applying protection coating of asphalt emulsion to a 4-million-gallon water reservoir. Among other uses in the petroleum industry is spraying fiber coating on oil-storage tanks and pipe lines to prevent corrosive action. *Alemite Division of Stewart-Warner Corp., Chicago, Ill.*

IT'S NEW CHECK IT

(5) LUBRICATION AND MAINTENANCE SYSTEM, a very elaborately assembled loose-leaf "Operator's Guide" for diesel-engine users. Purpose of this substantially bound book is to provide the man on duty with a quick reference pertaining to operation, maintenance and lubrication, periodic inspections, and adjustments. It is designed to rest on a portable flip board, situated on side of engine. Index tabs are visible to provide greatest ease in locating information.

Shown here is the guide on one diesel in quad of four engines coupled together and delivering power to a single driveshaft. Another



multiple engine development is the Twin 6-71 power unit. Here two engines are coupled together, and like the quad, deliver power to a single driveshaft. Simplicity of this engine, with right or left-hand rotation, and the fact that accessories can be mounted on either side of its symmetrical cylinder block, have permitted development of these multiple-engine power units. They are expected to provide more power with less weight and in less space for many postwar applications. *Detroit Diesel Engine Division, General Motors Corp.*

IT'S NEW CHECK IT

(6) FLUORESCENT ANALYSIS. "Fluorochemistry in Petroleum Science" is a new bulletin by a research chemist with a manufacturer of fluorescent ultraviolet lamps. Information contained is of value to those interested in fluorescent analysis of oil-bearing sands, cores, shales and muds. Fluorochemical exploration for oil by use of soil samples is discussed. Bulletin is No. 2 of a series printed in a form for convenient filing. *Ultra-Violet Products, Inc., Los Angeles, Calif.*

IT'S NEW CHECK IT

OIL AND GAS EQUIPMENT Digest

IT'S NEW ✓ CHECK IT

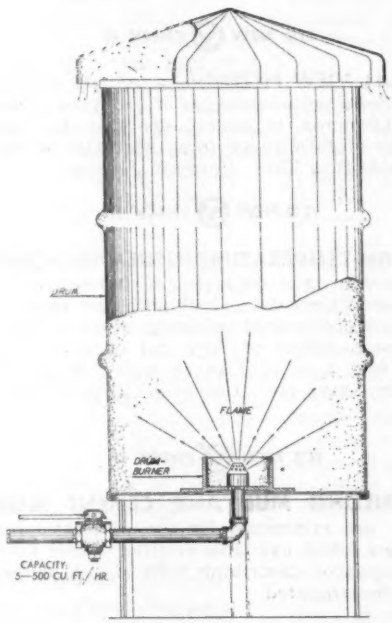
TRADE LITERATURE

(7) FLAME-RESISTANT GASKETS. A new type gasket is made of a felt base impregnated with chromate-pigmented compound. Originally intended as a substitute for low-pressure soft rubber

gaskets, the new material brings the features of flame and fire resistance, nondecomposition to prolonged exposure to salt water, and rust inhibition forward for additional applications. Available in ⅛-in. and 1/16-in. thickness, factory precut or in sheets. *Sherwin-Williams Co., Cleveland, Ohio.*

IT'S NEW ✓ CHECK IT

(8) DRUM GAS BURNER. This burner is designed to solve oil-field heating problems. It is a specially adapted burner for fitting into an oil drum, or a piece of casing, or a piece of old pipe. It makes an efficient heater for warehouses, storerooms,



machine shops, garages, etc. It can be used on any type gas at any pressure. It is furnished with burner head suitable for ⅜-in. or ¾-in. gas connection. Capacity 5 to 500 cu. ft. per hr. can be used with or without brick baffles. No adjustment needed. *John Zink Co., Tulsa, Okla.*

IT'S NEW ✓ CHECK IT

(9) CARCOMATIC CLUTCH, a folder describing new air-operated clutch, setting out such features as compactness, short-coupled, safety, unaffected by centrifugal force, remote control, unlimited capacity. *Pacific Car & Foundry Co.*

IT'S NEW ✓ CHECK IT

(10) AUTOMATIC-LOCKING DIFFERENTIALS, to prevent individual wheel spinning when seismograph, drilling, and well-servicing automotive equipment hits mud, gumbo, and other hard-to-get-through territory, are described in new bulletin. *Thornton Tandem Co.*

IT'S NEW ✓ CHECK IT

(11) OXYACETYLENE PRACTICES, as to flame-cleaning steel before painting, removing old paint, reclaiming superheater piping, removing rivets, hardening and tempering operations, are pictorialized in new bulletin. *Air Reduction Co.*

IT'S NEW ✓ CHECK IT

(12) OIL BURNERS, convertible to combined oil-gas use, are covered in folder which describes and illustrates mechanical and operating features for natural or forced-draft operation, with either mechanical or steam atomizers. *Peabody Engineering Corp.*

IT'S NEW ✓ CHECK IT

(13) X-RAY DIFFRACTION APPARATUS, for identifying, comparing and analyzing materials, is described in 12-page booklet which also treats techniques and applications. Booklet catalogs many specific problems that can be handled. *North American Philips Co., Inc.*

IT'S NEW ✓ CHECK IT

(14) ALKALI-AND-ACID RESISTANT CEMENT, comes in liquid or powder form for mixing on the job. Taking an initial set in less than 30 minutes, it is used as a mortar in masonry for tank linings, floors, sewers, towers, and other items. Bulletin lists types, porosity, chemical resistance, physical properties and technical data. *The U. S. Stoneware Co.*

IT'S NEW ✓ CHECK IT

(15) PIPING, PRESSURE VESSELS, HEAT EXCHANGE EQUIPMENT, are treated pictorially in 15-page bulletin. Cross-sections of typical heat exchanger, reboiler, condenser, evaporator, feedwater heater (high pressure), transfer line exchanger (above 1,000° F.) are included, together with diagrams of a number of advanced heat-exchanger features. *Alco Products Division.*

IT'S NEW ✓ CHECK IT

(16) CARE AND HANDLING OF HEAT EXCHANGERS, a manual digesting much constructive information on installation, operation and maintenance of heat transfer equipment. Brief but thorough. *The Whitlock Manufacturing Co.*

IT'S NEW ✓ CHECK IT

(17) MATERIALS HANDLING EQUIPMENT, a 76-page book profusely illustrating uses for lift trucks, skid platforms, fork trucks, stackers, cranes, floormaster floor trucks, and a large selection of specially built equipment for unusual jobs in production, process and in storage. *The Lewis-Shepard Co.*

IT'S NEW ✓ CHECK IT

(18) KIDDE INDUSTRY, a bimonthly publication on fire protection and plant safety; on new developments in high-pressure gases; and on uses of various items of safety equipment. *Walter Kidde & Co., Inc.*

IT'S NEW ✓ CHECK IT

(19) SEAMLESS TUBING, close tolerance, cold reduced. A well-illustrated technical booklet dealing with the manufacturing and characteristics of steel tubing, and the Rockrite process for its formation. *Tube Reducing Corp.*

IT'S NEW ✓ CHECK IT

(20) BRAZING CARBIDE TOOL TIPS, a bulletin on recommended procedure for this operation, containing lists of reasons why the Easy-Flo No. 3 product is favored for carbide tipping. *Handy & Harman.*

IT'S NEW ✓ CHECK IT

(21) ROPEOLOGY, a very informative periodical on use and maintenance of wire rope. Available to rope users in oil industry wishing to receive Ropeology regularly. *Macwhyte Co.*

IT'S NEW ✓ CHECK IT

(22) COMPAR, A REMARKABLE ENGINEERING MATERIAL — is title of this new 16-page catalog of industrial products made from Compar, the specially compounded solvent-proof vinyl resin. The properties, characteristics and specifications of such products as the following are included: Low-pressure lube hose; low and medium-pressure hydraulic hose; superchemical hose; transparent "V" tubing, etc. *Resistoflex Corp.*

IT'S NEW ✓ CHECK IT

(23) CASING SUPPORT, a bulletin describing National's Type "A" support, designed to provide economical means for supporting medium-length strings where no pressures are to be packed off outside the casing suspended. *National Supply Co.*

IT'S NEW ✓ CHECK IT

(24) MULTIPLE V-BELT DRIVES. Their basic advantages set out in a primer-like presentation in the new booklet entitled "19 Reasons Why It Is the Dominant Drive of Industry." Dramatically illustrated; useful; practical. *Multiple V-Belt Drive Association.*

IT'S NEW ✓ CHECK IT

(25) SPRINGS, a technical bulletin packed with valuable data on selection, design, and use of springs for industrial applications. Such specialty springs as volute, helical compression, helical extension, helical torsion, and Belleville disk springs are covered. *Railway Steel-Spring Division, American Locomotive Co.*

IT'S NEW ✓ CHECK IT

(26) WIRE GROMMET V-BELTS, a new folder explaining and picturing construction of the wire grommet V-belt, and outlining its particular usefulness in handling tough transmission problems. *The B. F. Goodrich Co.*

IT'S NEW ✓ CHECK IT

(27) THE USE AND OPERATION OF TACHOMETERS, a new bulletin showing full-face and profile views of individual-mount and portable hand tachometers, and giving ranges available, mounting dimensions, etc. *Jones Motrola Co.*

IT'S NEW ✓ CHECK IT

(28) FULL VIEW FITTINGS, a bulletin setting out applications and advantages of full-view glass fittings. Designed to enable operator to observe velocity, uniformity of flow, character of liquid, etc., inside flow lines. *Henry E. Jacoby.*

IT'S NEW ✓ CHECK IT

(29) HIGH-TEMPERATURE INSULATING CEMENT is covered in new booklet containing many valuable operating data. Included are means for computing economical thickness of insulation and heat losses, tables of fuel and energy loss per square foot area of furnace walls, energy losses per hour, day, etc. *Universal Zonolite Insulation Co.*

IT'S NEW ✓ CHECK IT

(30) DRILLING MUD AND CEMENT SLURRY LOSSES are minimized by use of plastic materials. New folder available entitled "Thief Formation Insurance" describing uses of this material. *Dowell Incorporated.*

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

Keep Informed. Save Time. Tear Out Card. Check It. Mail It.

Natural Gas

Proceedings Consolidated In Natural-Gas Cases

WASHINGTON. — Pointing out that they may involve substantially similar issues, Federal Power Commission has consolidated proceedings in the applications of Greenfield Gas Co., Inc., Greenfield, Ind.; Panhandle Eastern Pipe Line Co., Kansas City, Mo., and Eastern Indiana Gas Co., New Castle, Ind., for certificates of public convenience and necessity. Hearing is set for February 26.

Greenfield asks permission to construct and operate about 5 miles of 3-in. transmission pipe line from Fortville east, to connect with Panhandle Eastern's 4-in. line, which runs from the latter's main line south to Greenfield, and also an order directing Panhandle Eastern to interconnect its 4-in. line with Greenfield's proposed 3-in. line and to sell natural gas to Greenfield at the interconnection.

Panhandle Eastern seeks authorization to construct and operate 3.7 miles of 3-in. pipe line beginning at a point on the company's 4-in. "Greenfield lateral" in Hancock County and extending west to a point near Fortville, together with metering and regulating stations.

Eastern Indiana wants to construct 3.7 miles of 3-in. line from a point on Panhandle Eastern's "Greenfield lateral" and extending to a point near Fortville, and also ½ mile of 2-in. line from the proposed 3-in. line north to the town of Ingalls, Ind.

Greenfield serves consumers in and adjacent to Greenville and Fortville and to the State Reformatory near Pendleton, Ind. Eastern Indiana serves 16 towns and certain rural communities, including Fortville and McCordsville, Ind.

New Dates Set by FPC for Hearings on Gas Projects

WASHINGTON.—Dates for hearings on two natural-gas projects have been changed by Federal Power Commission. The hearing previously set for February 8 on the application of Reynosa Pipe Line Co. for authorization to export gas from Texas to Mexico has been advanced to January 29. The hearing previously set for January 29 on the application of Tennessee Gas & Transmission Co. for permission to construct and operate about 65 miles of pipe lines of varying length from its main Texas-to-West Virginia line to Texas gas fields has been postponed to February 8.

SEC Sets Columbia Gas Hearing for February 6

The Securities and Exchange Commission has set opening of hearings on Columbia Gas & Electric Corp.'s reorganization plan for February 6.

Under the plan, designed to meet requirements of the holding company act, Columbia's existing preferred, preferent and common stock will be reclassified into a single class of capital stock for distribution among present holders.

The Cincinnati and Dayton groups of subsidiaries will be separated from the parent system and their common stocks distributed among holders of Columbia's securities.

Louisiana's Gas Fight May Go to Supreme Court

BATON ROUGE. — State officials say Louisiana intends to carry the Memphis Natural Gas Co. case to the U. S. Supreme Court, if necessary, and is ready to spend at least $100,000 in efforts to preserve the state's natural-gas reserves. The State Board of Liquidation approved allocation of that amount of money, and members of the legislature approved by telegraphic poll an emergency appropriation.

Part of the fund is to be used in contesting through the courts the so-called Memphis natural gas case which involves a proposed "double tracking" of the pipe line which supplies natural gas from the Monroe (La.) field to the Memphis area and construction of a new line from the Lisbon gas field to Monroe to supplement the supply.

Money also would be used to set up a state organization to participate in a federal nationwide investigation of gas resources and uses, and generally to conserve the state's supply.

In a resolution, the liquidation board said that current litigation involving the case "unquestionably" would go to the Supreme Court.

Governor James H. Davis, board chairman, described the case as "a critical one" for the state, adding:

"It means much. As long as they can siphon our gas to those states we'll never be able to bring industries to Louisiana, and we may not be able to hold on to what we have."

University Has $176,000 for Schoch Process Research

AUSTIN.—With a new gift of $10,000 from six oxygen and acetylene manufacturing companies, University of Texas now has $176,000 for use in financing a 3-year program for research in developing products from natural gas by means of electric discharge, a discovery of E. P. Schoch, university chemical engineer.

Channel Black Needed for Heavy-Duty Tires

WASHINGTON.—Sharp expansion in the output of channel black, an ingredient of synthetic rubber, is necessitated by military demand for heavy-duty tires. W. F. Twombly, director of the compounded chemical division of War Production Board, said that enlarged facilities for production of an additional 175,000,000 lb. annually are being constructed and that contracts for another 175,000,000 lb. a year will be awarded as sources are located.

Twombly said the expanded production will come principally from the Pampa, Tex., area and other points in Texas, Oklahoma and New Mexico, where large supplies of natural gas are readily available.

In order to increase production of channel black, new supplies of natural gas must be found. At the present time, a survey is being made to seek out all supplies of natural gas that may be used. About 375,000,000 cu. ft. of gas per day will be required for the increased production, it was explained.

Memphis Natural Hearing Indefinitely Postponed

NEW ORLEANS. — With both sides in the case agreeing to the action, Federal Judge Wayne G. Borah last week signed an order indefinitely postponing hearing on application of Memphis Natural Gas Co. for a preliminary injunction against the State Highway Department, restraining it from canceling highway crossing permits issued in connection with the construction of a new pipe line between the Lisbon field and Monroe.

REFINING

Refiners in District 2 Get Orders to Share Crude

CHICAGO.—Thirteen refiners in District 2 (Midwest) have received orders from Petroleum Administration for War requiring them to share their crude supplies with 25 other refiners in the district. In conformity with the order, issued under the wartime crude-allocation plan, an average total of 19,150 bbl. of crude will be shipped daily through January to refiners whose crude supplies are inadequate by refiners more advantageously situated.

This is the same number of supplying companies as in December, but the quantity of crude to be moved is greater, and one more refiner is to receive help. The daily average crude shipments in December for sharing purposes totaled 17,475 bbl. The program is under the direction of the crude-supply panel of the District 2 refining committee.

Chemical Cocktails Impart New Properties to Lubes

NEW YORK.—Chemicals worth some $20,000,000 are being introduced into petroleum annually at the rate of a droplet to a gallon, or a cupful to a tank car, with results that are almost magical, according to a report presented to the directors of Socony-Vacuum Oil Co. Six kinds of droplets are described in the report.

The droplets—chemical cocktails—impart new properties to lubricating oils. One kind enables a lubricant to withstand higher pressures without rubbing bare and permitting the welding of overheated metal. The droplet raises this pressure limit from 5,000 lb. to more than 30,000 a square inch. How they do the trick is not wholly clear. One theory is that they cause a chemical reaction on the metal, which seems to produce a film that acts like oil. The effect also is somewhat like dirt on a soldering iron, which renders soldering impossible.

Another droplet keeps oil flowing freely at temperatures down to 25° below zero. Many oils solidify in cold because of paraffin waxes present in petroleum. The new additive still allows the wax to solidify, but keeps the particles small and separated, so that they cannot link up to make the oil solid. For oils and greases at colder than 25° below zero, the wax still is filtered off.

Another droplet is a soap soluble in oil, which keeps pistons and rings free from lacquers and carbonaceous deposits. The soap picks up the particles and holds them harmless in the oil.

Two droplets are used to counteract the deteriorating effect of oxygen, which forms acids and sludges. Some of the metals in machines hasten this oxygen deterioration by acting as catalysts. Two kinds of droplets are used to stop the oxygen spoilage. One type, such as nitrogen compounds and carbolic acid compounds, protects directly against the air. The other, according to one theory, poisons the metal surface so that it no longer is able to speed the reactions.

A fifth additive increases the slipperiness of oil. When an oil film becomes extremely thin, it begins to lose "slip." The additive restores it.

The sixth additive protects metal parts from rust. Moisture is able to get through even oil films on metal. A few tenths of a per cent of the rustless additive fixes the lubricating film so tightly that moisture is unable to penetrate.

W. K. Bergen Promoted by Standard Oil Co. (Ohio)

Appointment of W. K. Bergen as superintendent of the Toledo refinery of Standard Oil Co. (Ohio) was announced January 12 by G. W. Hanneken, company vice president. Bergen, who was formerly assistant superintendent, succeeds Dr. F. J. Sanders who has been named superintendent of No. 2 refinery at Cleveland.

Born in Sheridan, Wyo., Bergen received a degree of chemical engineering in 1929 from the University of Cincinnati and Master of Science in 1930. In the same year he became associated with Standard Oil Co. of Ohio in the engineering department at Lima, Ohio, refinery.

Subsequently, he became cracking foreman at Lima and in 1933 was made cracking foreman at Sohio's Latonia, Ky., refinery. In 1940 he was transferred to the Toledo refinery as assistant superintendent.

Bergen is succeeded as assistant superintendent by C. O. Rowley, formerly general foreman in the process department. Rowley completes 25 years of service this month

Wood River Plant Receives National Security Award

WOOD RIVER, Ill.—The National Security Award was presented to the Wood River refinery of Standard Oil Co. of Indiana last week in recognition of its "superior standard of protection and security." The certificate, awarded by United States Office of Civilian Defense, says "Effective joint efforts to safeguard production, employes and property have made possible this achievement, which stands as a mark of distinction in the nation's war effort."

The Wood River plant produces aviation and motor gasoline, fuel oils and lubricants for the armed forces as well as petroleum products for war industries and general use.

Gulf Coast Gasoline Stocks Continue Upward Trend

HOUSTON.—Stocks of all grades of gasoline and naphthas at plants in Gulf Coast Refiners Association continued their upward trend in the second half of December 1944, totaling 1,617,614 bbl., an increase of 39,431. A year ago gasoline inventories at the same plants aggregated 1,384,949 bbl. Two years ago they were 2,404,807 bbl., or 787,193 more than the current figure.

Automotive stocks considered alone were 416,078 bbl. on December 31, a decrease since December 15 of 93,593 and only 35 per cent of the 1,165,388 bbl. reported on January 1, 1943. Refiners says this indicates the need for further improvement in gasoline stocks to restore them to proper working levels.

Total stocks of all products in plants of the association group were reported at 4,138,313 bbl. December 31, a decrease of 57,797 during the second half of the month. A year ago total stocks were 3,334,586 bbl. Two years ago they were 5,489,709

OIL and GAS
BURNING EQUIPMENT
NATIONAL
AIROIL
BURNERS
1236 E. Sedgley Ave.
PHILADELPHIA 34, PENNA.

bbl., then considered about normal.

Crude oil runs to stills totaled 132,280 bbl. daily, maintaining the high levels reported during past months. Crude runs were 91.2 per cent of present rated operating capacity and represent an increase of 39,246 bbl. daily in comparison with operations at 76.5 per cent of capacity a year ago when the group processed 93,034 bbl. a day.

OPA Makes No Change in East's Fuel-Oil Ration

WASHINGTON.—Fuel-oil rations for the East Coast are unchanged at 10 gal. per unit for Period 3, beginning January 15, Office of Price Administration announced last week. A contemplated reduction in unit value had to be abandoned because of severe weather. Consumers were told they must ration their own daily use of fuel oil, since supplies for this period of the heating season were the lowest since rationing.

Maintenance of the 10-gal. value for ration coupons, OPA said, "actually represents a cut to consumers in relation to their increased demands" caused by excessively cold weather along the Atlantic seaboard.

Period 3 unit values for all other rationed areas previously were fixed at 10 gal. per unit. This period began January 8 in the Pacific Northwest and combined Periods 2 and 3 began December 18 in the Midwest and South.

Vanadium Obtainable From Oil, Russ Scientist Says

Certain petroleum fractions, particularly asphalt, may become an important source of vanadium, according to a paper presented by A. P. Vinogradov before Russian Academy of Sciences. A summary of the paper reaching this country has been translated by J. G. Tolpin, editor of Universal Oil Products Co. Survey of Foreign Petroleum Literature. It discloses that a semicommercial plant is producing ferrovanadium from asphalt derived from Ural crude, which may contain vanadium in quantities as high as 43 per cent of the ash.

It is known asphalt from certain American crudes, notably in California and Oklahoma, contains considerable percentages of vanadium.

In 1940, latest year for which figures are available, more than 2,000,000 lbs. of vanadium was produced in the United States, and more than 2,500,000 lbs. imported. Peru is the principal source of this country's imported vanadium. Demand has increased greatly during the war.

PENBERTHY
"TRANSPARENT"
DROP FORGED STEEL
LIQUID LEVEL GAGES

Used to observe color and density of liquids under high pressures and/or temperatures. Construction exceptionally sturdy. Made of alloy temperature resisting steel, and are highest quality throughout. Liquid chamber made from solid block of steel to assure perfect alignment and rigidity. Conform with A.P.I.—A.S.M.E. requirements.

The "Transparent" is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

ARMSTRONG Inverted Bucket STEAM TRAPS
ARE UNCONDITIONALLY GUARANTEED

THE ARMSTRONG GUARANTEE:

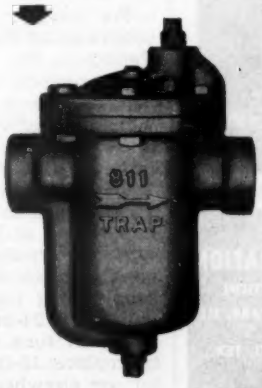
Every Armstrong Trap is guaranteed to be free from defective workmanship or material, to function perfectly, to fulfill all claims in every respect and to give complete satisfaction.

A guarantee that can be afforded only by the proved performance of the product.

Over a Million Armstrong Traps in Use!

ARMSTRONG MACHINE WORKS
888 Maple Street, Three Rivers, Michigan

Below — Side-inlet, side-outlet body style for straight line pipe connections. Trap can be inspected or repaired by removing cap, leaving body in the line. For pressures to 600 psi.



Above—Bottom-inlet, top-outlet body style. Cast semi-steel for pressures to 250 psi. Forged steel for pressures to 2400 psi. and where the extra safety of all steel fittings is desired.

PIPE COATING AND WRAPPING SPECIFICATIONS

Easy as A-B-SEE!

To simplify ordering pipe coating and wrapping, Pipe Line Service Corporation offers you the easiest specifications you could ask for. You indicate either "Specification A" or "Specification B" together with the coating material desired and PLS does the rest. When you consider that you can get any type of protection you want, it's just good business to let Pipe Line Service assume the complete responsibility for the finished job.

SPECIFICATION "A"

INCLUDES
(1) Mechanical cleaning.
*(2) Mechanical priming with desired primer.
(3) Hot application of desired coating.
(4) Hot application of desired coating.
(5) One spiral wrapping of desired wrapping material.
(6) One spiral wrapping of heavy kraft paper.

SPECIFICATION "B"

INCLUDES
(1) Mechanical cleaning.
*(2) Mechanical priming with desired primer.
(3) Hot application of desired coating.
(4) Hot application of desired coating.
(5) One spiral wrapping of desired wrapping material.
(6) Hot application of desired coating.
(7) One spiral wrapping of heavy kraft paper.

PROTECTIVE COATING MATERIALS AVAILABLE ON ABOVE SPECIFICATIONS

Asphalts
Barrett Millwrap Enamel
Barrett Pipe Line Enamel
Barrett Waterworks Enamel
Bitumastic Regular Enamel
Bitumastic 70-B Enamel
Bitumastic XXH Enamel
Ennjay Enamel
*No-Ox-Id
Reilly Filled Pitch Enamel
Reilly No. 230 Enamel

*Primer not required with No-Ox-Id coatings.

PIPE LINE SERVICE CORPORATION
PIONEERS IN STEEL PIPE PROTECTION
General Office and Plant—FRANKLIN PARK, ILL.
Plants at—GLENWILLARD, PA.
LONGVIEW, TEX. • CORPUS CHRISTI, TEX.

PIPE LINES

Phillips Prepares to Lay 100 Miles of Line

Phillips Petroleum Co. is receiving bids this week for two projects, totaling 100 miles in length, contracts for which are to be let immediately with the expectation that construction will soon be under way. One is for 30 miles of 24-in. in the Dumas-Borger area of the Texas Panhandle which will supply carbon-black plants. The other is 70 miles, sizes from 2-in. to 20-in. for a wet-gas gathering system in the West Edmond field, Oklahoma.

Capacity Raised on Sinclair Venezuela Line

Sinclair Oil Corp. has been advised that deliveries through the pipe line from the Santa Barbara oil field to the Puerto de la Cruz, Venezuela, terminal have been increased to 52,000 bbl. a day from the original capacity of 40,000 bbl. a day. This is with only part of the additional pumping equipment installed.

With the installation of pump stations for which all the material is on the ground, the line will have a capacity of 75,000 bbl. a day and make possible the loading of tankers with about 2 million barrels of crude oil monthly.

The pipe line and terminal are properties of Venezuelan Petroleum Co. and its subsidiary, Compania Consolidada de Petroleo.

Phillips Completes Large Gathering System Program

For serving the Fairway pool, southwest of Pampa, Texas, Phillips Petroleum Co. is completing a 42-mile crude-oil gathering system as part of a program in that area for which a total of approximately 100 miles of pipe has been laid. This project has been contracted by United Contracting Co., which is also engaged in revamping the Phillips system at KMA, Tex., where a total of 7 miles of pipe is being handled in a replacement and reconditioning job. This involves the laying of 24-in. to replace 16-in. which in turn replaces 12-in. used to replace 10-in. being transferred for use elsewhere. Reconditioning is done on the 16-in., 12-in. and 10-in pipe after it is removed from the ground.

Recent crude-oil gathering-system construction operations of Phillips are the laying of a 16-mile 8-in. line at the University pool, West Texas, and participation in the Sohio-Standish 15-mile 8-in. West Edmond-Oklahoma City line which went into operation early this week.

Britain Builds Large Pipe Line System

To meet the needs of Allied forces, Britain since 1941 has built a connecting pipe-line system 1,000 miles long, together with scores of secret underground storage tanks capable of holding large reserve stocks of oil.

About 2,400,000,000 gal. of oil, including hundreds of millions of gallons of aviation fuel, has been carried to the principal centers of consumption, especially airfields. The daily average quantity of fuel pumped through this network is 5,000,000 gal.

Interstate Announces New Appointments

Several major personnel appointments for the Interstate Oil Pipe Line Co. have been announced by L. F. Kahle, executive vice president of the new organization which was formed as a result of the consolidation December 31 of operations of the Oklahoma Pipe Line Co. and the Standard Oil Co. of Louisiana, pipe line department.

The appointments include J. W Cason, former chief accountant of the Louisiana company's pipe line department, as comptroller, and P. H. Hunter, former chief tax accountant for the Standard Oil Co. of Louisiana, as secretary in charge of all legal and tax matters. H. P. Hellinghausen will continue as treasurer of the company.

Interstate also announced the appointments of Sequoyah Brown, former employment manager for The Carter Oil Co. as head of the employes relations department; and W. B. Fulton, for the last 25 years chief engineer for the Louisiana company's pipe line department, as chief engineer for Interstate.

Cason, Hunter and Fulton arrived

last week in Tulsa where their offices will be located.

Appointments of W. R. Finney as president of the new organization, with offices in New York; Kahle as executive vice president; Bruce Ramsey, vice president and manager of the northern division; and Smith W. Day, vice president and manager of the southern division, were announced last month. Main offices of the Interstate will be in Tulsa and the division offices will remain at Shreveport and Tulsa. Field staffs of the two divisions will remain almost intact.

PAW Approves Sinclair Lines in Wyoming

WASHINGTON.—Petroleum Administration for War has announced War Production Board approval of two project applications filed by Sinclair Refining Co. to provide pipe-line outlets for crude oil produced in Fremont County, Wyoming.

One Sinclair application covers construction of 25 miles of 8-in. line from the Crook's Gap area of Fremont County, to a connection with the existing line at Lost Soldier, Sweetwater County, which will be laid with second-hand pipe. The other covers a 32-mile 8-in. extension of that line from Creek's Gap to Big Sand Draw field in Fremont County, which will be laid with new pipe.

Pump stations will be erected in each field with two 10,000-bbl. storage tanks and necessary pumping equipment at each station, according to the application approved by WPB.

Castiac-Fremont Link to Be in Service Soon

LOS ANGELES.—General Petroleum Corp. of California expects to put in service this month a 10-mile 6-in. line connecting Castiac and Fremont junctions which is required for adequate handling of crude oil from the Elk Hills, Calif., field.

Anglo-Iranian Expansion Within Iran Territory

Expansion of the pipe-line system of Anglo-Iranian Oil Co., Ltd., discussed as a postwar program, is reported to involve only lines within the Iran territory in which the company operates. Difficulty would be encountered in obtaining permission to lay a line across Iraq to the Mediterranean.

The Anglo-Iranian company, in which the British Government has a majority share interest, controls the Iranian oil fields from which comes most of the current production in the Middle East. The company recently announced addition to its war-contingency and defense-repair funds of £500,000 sterling bringing the total of the fund to £3,000,000.

Humble Imogene Extension Line

The Charlotte Edwards lime oil pool of Atascosa County, Texas, will be given an outlet for its oil production by Humble Oil & Refining Co. which discovered it. Humble has let contract for 6-in. pipe line extension from the Imogene pool, approximately 20 miles, with the line scheduled for completion by January 20.

Empire Shifts Title To Natural-Gas Line

The Federal Power Commission has granted the Empire Gas & Fuel Co. of Wellsville, N. Y., permission to acquire about 8 miles of pipe line from its affiliate, the Empire Producing Corp.

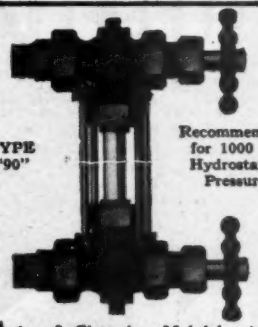
The pipe line, which lies in Pennsylvania, connects lines of the New York State Natural Gas Co., and Empire.

BUCKEYE MODEL 12 digs more trench in less time, at lower cost. Digs trench 15" to 24" wide — up to 5½' deep.

BUCKEYE TRACTION DITCHER COMPANY
Findlay, Ohio
Built by Buckeye
TRENCHERS. SHOVELS. CRANES
BACKFILLERS. TRACTOR EQUIPMENT.

C. S. FOREMAN COMPANY
General Contractors
PIPE LINES
20 West Ninth Street
Kansas City, Missouri

PENBERTHY
DROP FORGED STEEL
LIQUID LEVEL GAGES



Made of Chromium-Molybdenuin alloy temperature resisting steel, extra heavy throughout and stainless steel trimmed. Positive automatic shut-off; stainless steel balls shut off the flow of liquid if glass breaks. Regrinding removable seats, heavy duty stuffing boxes, union connections. Conform with A.P.I.—A.S.M.E. requirements.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

IT'S NEW — THE HOLAN 2-TON WINCH

The Latest Development In Compact, Easily Operated Winches — Tops In Quality

Small and compact, this winch is exceptionally easy to operate and very efficient. Two speed ratios permit handling heavy loads at slow speeds and light loads at high speeds. Perfect control is assured for raising load. When lowering load, control is secured by a single shoe hand brake that has sufficient capacity to hold full load. Full rated load is 4000 lbs., but each winch is tested at factory by applying a load of approximately 6000 lbs.

Write for Detail Information

THE AMERICAN COACH & BODY CO.
9307 WOODLAND AVE. AT E. 93RD ST.
CLEVELAND 4, OHIO

NORRIS SUCKER RODS Tops IN QUALITY

Back of Norris Sucker Rods is the experience of over half a century building QUALITY into Oil Tools—Years of experimentation and study to improve processing and manufacture to bring you the top quality Sucker Rods on the market.

Available in 25 or 30 foot lengths. Each rod is carefully built from materials of known strength, composition and uniform characteristics, with rigid adherence to A. P. I. specifications and close control over each step in manufacture, including normalizing, heat treatment, forging and final precision threading. Select NORRIS QUALITY SUCKER RODS to meet your particular requirements with the assurance that you are buying maximum service at lowest cost.

TYPE 20
Carbon Steel

Recommended for regular to heavy loads where corrosive conditions are not a factor. These rods are giving excellent service, replacing in many instances competitive rods of supposedly higher grades steel. A. P. I. Specifications. Box & Pin and Double Pin.

TYPE 30
Carbon Manganese Steel

Recommended for extra heavy pumping conditions where corrosion is not a factor. CARBON - MANGANESE Steel to special Norris alloy specifications. Very high ultimate tensile strength, yield point and shock resistant qualities. Box & Pin and Double Pin.

TYPE 40
Nickel Molybdenum Steel

Recommended for wells where heavy loads are encountered and where irregularities in pumping movement are unavoidable. The NICKEL and MOLYBDENUM content in this rod aids materially in their resistance to corrosion fatigue. A. P. I. Specifications. Double Pin Type only.

EXPERIENCE BUILDING OIL TOOLS SINCE 1882

W.C. NORRIS MANUFACTURER, INC

TULSA, OKLAHOMA

BRANCHES
HOUSTON, KILGORE, ODESSA, TEXAS. SALEM, ILLINOIS
West Coast Distributors:
REPUBLIC SUPPLY COMPANY OF CALIFORNIA, Los Angeles

DISTRICT OFFICE:
Republic Bank Building, Dallas
EXPORT OFFICE: New York City

BUY WAR BONDS FOR VICTORY

Exploration and Drilling

Week's Highlights

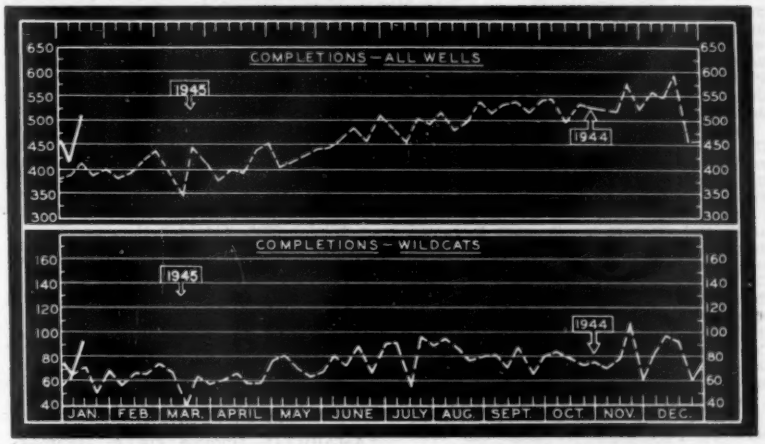
BOTH the geologists and the drilling contractors have additional cause for worry this week, wondering what the net effect will be of all the tough talk in Washington about manpower, although to date there seems to be no serious alarm.

Naturally there is no worry about the classification as a war industry. What causes concern is the general effect on the manpower supply and the possibility that deferments of some of the younger key men might be canceled during one of these mass psychological drives that occurs every time a situation like this arises.

The deferment question affects the geological executives particularly because of the vulnerability of their geophysical staffs. This is a comparatively new profession. The result is that, as a group, the geophysicists are very young men. That makes them a vulnerable group whenever there is any question of tightening up on draft deferments.

The geophysicist is always in the vanguard of the exploration team of the industry that moves ahead of the wildcat test. Where the geophysical parties are working this year, the wildcat wells will be drilled next year. Those left in the industry are already spread paper thin over the work that has to be done; to say nothing of the work that ought to be done but can't for lack of manpower. With PAW calling for even more wildcat tests in 1945 than in 1944, the geological executives say they can't afford to lose any of the remaining men.

The drilling contractors are uncertain about the net effect of the current manpower drive. They are not as vulnerable as the geophysicists in the matter of the age of their key men. As to their general labor requirements, some think that tightening of agricultural deferments will reduce a certain amount of help that was usually available during the slack period on the farms. Others think that the effect of increasing the total supply of labor to the most essential war industries will help them, either directly or indirectly. All anticipate that more paper work and appearances before government agencies will result.



Solid line charts current weekly completions, service wells in Eastern area included

COMPLETIONS IN ALL FIELDS . . .

Week ended January 13, 1945

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1945	1944
N. Y., Penna., W. Va.	42	11	*42	95	151,501	185	116
Ohio	0	4	2	6	22,712	22	34
Indiana	1	0	2	3	6,339	6	7
Kentucky	0	0	3	3	5,708	14	33
Illinois	27	0	23	50	130,096	87	64
Michigan	5	0	4	9	22,397	32	17
Kansas	6	0	10	16	54,130	41	49
Nebraska, Missouri, Iowa	0	0	4	4	19,835	8	4
Oklahoma	56	1	29	86	391,273	106	40
Texas:							
North Central	20	1	22	43	104,785	73	35
West	23	0	8	31	126,060	50	61
Panhandle	5	6	0	11	34,140	11	5
Eastern	0	1	0	1	8,526	13	21
Gulf Coast	24	5	16	45	316,709	76	14
Southwest	5	0	8	13	50,769	26	40
Total Texas	77	13	54	144	640,989	249	176
Louisiana:							
Northern	0	0	0	0	0	7	8
Southern	6	0	4	10	100,183	19	14
Total Louisiana	6	0	4	10	100,183	26	22
Arkansas	0	0	0	0	0	5	6
Mississippi	4	0	5	9	60,012	9	7
Southeastern States	0	0	1	1	6,010	1	†
Montana	1	2	0	3	5,494	8	7
Wyoming	5	0	0	5	23,149	9	4
Colorado-Utah	1	0	0	1	6,300	2	1
New Mexico	4	2	6	12	26,920	17	15
California	44	3	7	54	198,857	102	76
Total United States	279	36	196	511	1,871,905	927	678
Total previous week	229	30	157	416			
Total Jan. 15, 1944	189	42	121	352			

*Includes 36 service wells. †Included in total shown for Mississippi.

PERMIAN BASIN

Fort Stockton Pool Extension Seems Likely

MIDLAND.—The Texas Co. 1 C. R. Hart, Pecos County wildcat a mile southwest of nearest production in the Fort Stockton pool, looks like an important extension to that area. On drill-stem test from 2,792-2,879 ft., open 2 hours and 20 minutes, oil and drilling fluid came in hole at estimated rate of 5 bbl. hourly, with a good show of gas. It is in NE SE, Section 2, Block 114, GC&SFRR Survey. Phillips Petroleum Co. 1 Powe, 11,000-ft. project northwest of Fort Stockton, is drilling at 4,610 ft. in lime.

Crane County.—Humble Oil & Refining Co. 1 G. H. Cowden is a new Ordovician wildcat contracted to 8,500 ft. Location is NE SE, Section 35, Block X, CCSD&RGNG Sur., 2 miles northwest of the shallow Crane-Cowden field, and about 13 miles north and west of the Crossett Devonian lime pool. The Crossett area has been extended ¼ mile southwest at The Texas Co. 2-A Hobbs, Section 46, Block 35, which flowed 170 bbl. of oil in 24 hours through 20/64-in. choke from total depth of 5,374 ft. in Devonian lime. Sinclair Prairie Oil Co. 1 Jennie McKnight, Ordovician wildcat in northwest part of county, is drilling past 8,576 ft. in chert.

Dawson County.—Richmond Drilling Co. 1 J. W. Nelson, small discovery well in northern part of the county, has been completed pumping 167 bbl. of 33-gravity oil daily from pay between 4,750-4,923 ft. It made 3½ bbl. the last hour of the 24-hour test.

Andrews County.—Frankel Bros. 1-E University, Section 22, Block 33, on the south edge of southeastern part of Fullerton pool, showed only a scum of oil while trying to complete at 7,238 ft. and was shut down for orders. Chalmette Petroleum Corp. 1 Lake Shore Corp., semi-wildcat 1½ miles north of the Fullerton field, is drilling below 3,900 ft. in lime. Union Oil Co. 9 Biles, on the west side of the Union pool, was shut down for orders after recovering 750 ft. of mud with no shows on drill-stem test at 8,476-8,612 ft., in the Siluro-Devonian section. Sun Oil Co. 1 Martin, wildcat northwest of West Andrews pool, is making drill-stem test of shows between 5,780-5,924 ft.

Winkler County.—Gulf Oil Corp. has staked locations for four 10,000-ft. tests in the Keystone-Ellenburger field, surrounding its 46-E Keystone Cattle Co. which recently extended the deep area over a mile southeast. All four of the tests are on the Keystone lease. Gulf also is preparing to deepen its 8-E Keystone Cattle Co. from 4,465 ft., where it was abandoned in 1935, to the Ellenburger. It is about 2½ miles southeast of the nearest deep producer in the area.

WEST TEXAS WILDCAT COMPLETIONS

Glasscock County: Richfield Oil Corp. 1 Lois Bialock, Sec. 7, Blk. 35, Twp. 3-S, T&P Sur., 12 mi. NW Garden City, elev. 2,532 ft., Yates 2,000 ft,. lime 3,250 ft., dry, TD 4,125 ft.

Mitchell County: Humble Oil & Refg. Co. 1 Pruitt Keel, Sec. 22, Blk. 27, T&P Sur., 5 mi. NW Colorado, elev. 2,156 ft., San Andres 1,310 ft., dry in Ellenburger, TD 7,875 ft.

Pecos County: Southern Union Gas Co. 1 M. Monroe, Sec. 10, Blk. 193, TMRR Co. Sur., 11 mi. S Iraan, elev. 2,181 ft., dry in San Andres, TD 2,216 ft.

Terry County: DeKalb Agricultural Assn. 1 Jenkins, Sec. 29, Blk. DD, J. H. Gibson Sur., 6 mi. SW Wellman, elev. 3,417 ft., Yates 3,460 ft., San Andres 5,090 ft., dry, TD 5,797 ft.

TEXAS PANHANDLE

AMARILLO.—Humble Oil & Refining Co. 1 Hyslop, Deaf Smith County wildcat, recovered dry granite wash in cores between 6,578-96 ft. and is drilling ahead below 6,675 ft. Same operator's 1 Pronger, Sherman County, lost circulation at 4,763 ft. In Donley County, Stanolind Oil & Gas Co. 1 Lewis is drilling below 2,610 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Continental Oil Co. is starting a southeast offset to its 2-B-23 Skaggs, deep Wolfcamp discovery well which has been completed flowing 269 bbl. daily from casing perforations at 7,700-25 ft. through ¾-in. choke, 42.3° gravity, with gas-oil ratio 150 to 1. The new location is designated as 3-B-23 Skaggs, NE SW 23-20s-37e.

Humble Oil & Refining Co. 1 Federal-Keinath, eastern Lea County, is drilling below 9,930 ft. in shale and lime. Top of Ellenburger tentatively is picked at 9,675 ft., with well showing 870 ft. of salt water on drill-stem test at 9,732-82 ft. Stanolind Oil & Gas Co. 1-P State, 24-21s-34e, South Eunice area, which blew out recently at total depth 3,820 ft., making over 500 bbl. oil hourly, has run tubing and is connecting up to test.

SOUTHEASTERN NEW MEXICO WILDCAT COMPLETIONS

Eddy County: U. J. Hardendorf 1 Riggs, NW NE SE 7-20-30, elev. 3,207 ft., lime 1,180 ft., dry, TD 1,605 ft.

Neil H. Wills et al 1 Wills, 330 ft. out SE cor. Lot 14, Sec. 4-21-24, elev 3,758 ft., dry, TD 1,218 ft.

ROCKY MOUNTAIN

Sand Draw Discovery Flows 1,100 Bbl. Daily

DENVER.—The Sinclair-Wyoming Oil Co. 1 Unit, SW NW NW 14-32n-95w, discovery in the Embar and Tensleep, flowed at the rate of 1,100 bbl. per day through casing and tubing from the Tensleep on a short production test. Well then was shut in pending completion of pipe-line connections and rig moved to location for a north offset. The discovery had 308 ft. of Tensleep, most all of which was porous sand and showed no water.

More gas at Powder River.—Stanolind Oil & Gas Co. 1 La Fleiche, NE NE SE 23-36n-85w, a wildcat at Powder River station west of Casper, which showed for 4,800,000 cu. ft. of gas through 21 perforations opposite the Sundance at 2,489-2,509 ft., after plugging back from 4,237 ft., reperforated with 103 holes at 2,489-2,538 ft., unloaded and tested. It showed 9,270,000 cu. ft. of gas with a spray of water through the tubing with a shut-in pressure of 1,120 lb. on the casing and tubing. Operators are moving in rotary tools to do some more work on the well.

South Elk Basin test.—Continental Oil Co. 1 Ida Goodstein, NE SE SW 20-57n-99w, a wildcat south of the Elk Basin field, which showed 10,000,000 to 12,000,000 cu. ft. of gas in the Dakota at 5,390-5,439 ft. on a drill-stem test, took another test at 5,580-5,605 ft., in what probably is the Lakota. Open 15 minutes it showed gas at the rate of 1,000,000 cu. ft. per day. Another test is to be made at 5,656-81 ft. in the lower Lakota or upper Morrison.

Oil Mountain wildcat.—The Texas Co. 1 Clark, NE NE SW 35-33n-82w, Oil Mountain structure test west of Casper, a wildcat headed for the Madison, had a show of oil in the core from the top of the Tensleep at 2,628 ft. It was drilled to 2,735 ft. A drill-stem test is to be made.

Completion at Rangely.—California Co. 1 fee, C NE SE 30-2n-102w, Rangely field, western Colorado, an east offset to the discovery in the Weber, was completed at 6,300 ft. for 141 bbl. first 7 hours flowing through a ¼-in. choke on the tubing. It had the top of the Weber at 5,532 ft. and 7-in. was set at 5,618 ft. Two additional operations are getting under way at California Co. 3 fee, C SW NW 29-2n-102w, and 8 Gray, SE SE SE 24-2n-103w.

NORTHEAST NEW MEXICO WILDCAT COMPLETIONS

Rio Arriba County, Monero: L. R. Travis 1 Tierra Amarillo Grant, NE SW NW 21-31n-2e, dry at 705 ft., water in Dakota.

Torrance County, Palma: Stone Brothers 1 State, C NW NE 1-6n-13e, TD 828 ft., dry in pink sand.

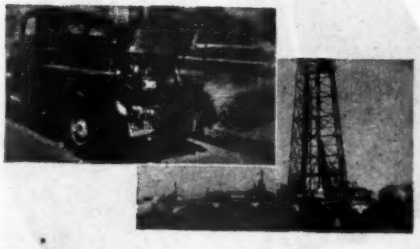
DAILY AVERAGE PRODUCTION FOR WEEK

	Jan. 13 crude oil	Distillate, allied products	January PAW quota all oils	Jan. 6 crude oil
Arkansas	81,400	4,900	84,900	81,000
California	887,750	59,800	947,800	886,250
Colorado	8,550	.....	9,500	9,450
Eastern	62,450	8,550	76,750	63,000
Illinois	203,400	12,000	212,000	206,400
Indiana	13,100	.....	12,500	12,600
Kansas	272,650	6,000	280,000	229,900
Kentucky	29,600	2,800	34,800	29,600
Louisiana	358,250	36,000	391,000	359,650
North Louisiana	69,050	.....	.....	70,450
South Louisiana	289,200	.....	.....	289,200
Michigan	50,700	600	47,600	49,250
Mississippi	50,150	.....	53,300	49,700
Montana	22,600	350	23,350	22,300
Nebraska	1,000	.....	1,200	1,000
New Mexico	103,100	5,600	110,600	103,100
Oklahoma	360,750	26,000	378,000	361,200
Texas	2,120,350	150,000	2,274,000	2,120,350
East Texas	370,900	.....	.....	370,900
East Central Texas	144,050	.....	.....	144,050
North Central Texas	143,150	.....	.....	143,150
Texas Panhandle	88,700	.....	.....	88,700
West Texas	478,600	.....	.....	478,600
South Central (S. A.)	20,050	.....	.....	20,050
South Texas (Laredo)	78,400	.....	.....	78,400
Lower Gulf Coast	243,900	.....	.....	243,900
Upper Gulf Coast	552,600	.....	.....	552,600
Wyoming	92,800	3,500	103,500	92,600
Total United States	4,718,600	316,100	5,040,800	4,677,350
Change from previous week	up 41,250	.....	.....	.....
Total production January 1-January 13, 1945				61,094,300 bbl.
Same period last year				56,794,955 bbl.

In The Oil Producing States Our Service Is Near You

SHOOTING

When you are ready to shoot a well, it's quick, reliable service you are looking for — the type of service rendered by Independent-Eastern Torpedo Company. Check the localities where we have service stations. For quickest service, call the station nearest you.



ACIDIZING

One sure way to obtain maximum production recovery from your oil and gas wells by acidizing is to call those with the "know how." Just call the Chemical Process Company station nearest you, and assure yourself the best results by Acidizing Specialists.

THE INDEPENDENT-EASTERN TORPEDO CO.
MAIN OFFICE: FINDLAY, OHIO

CHEMICAL TREATMENT OF OIL AND GAS WELLS
THE CHEMICAL PROCESS COMPANY
DIVISION OF
THE INDEPENDENT-EASTERN TORPEDO CO.
BRECKENRIDGE TEXAS

SHOOTING SERVICE STATIONS

ILLINOIS
Carmi
Casey
McLeansboro
Mt. Carmel
Salem
St. Elmo

KANSAS
Eldorado

KENTUCKY
Henderson

MICHIGAN
Mt. Pleasant

MONTANA
Cutbank
Shelby

NEW MEXICO
Hobbs

OKLAHOMA
Nowata
Oklahoma City
Tulsa

OHIO
Findlay
Wooster

TEXAS
Abilene
Big Spring
Borger
Breckenridge
Fort Worth
Midland
Monahans
Odessa
Pampa
Seagraves
Wichita Falls

ACIDIZING SERVICE STATIONS

KANSAS
Hugoton
Wichita
Russell
Great Bend

LOUISIANA
Shreveport

OKLAHOMA
Guymon
Tulsa
Seminole

NEW MEXICO
Hobbs

TEXAS
Borger
Midland
Odessa
Wichita Falls
Holliday
Luling
Breckenridge
Levelland

N. CENTRAL TEXAS

Grayson County Test Logs Favorable Showing

WICHITA FALLS.—Pure Oil Co. 1 Little, Grayson County wildcat 2 miles southwest of Gordonville, is believed to have encountered sufficient oil sand to make a producer but as yet no tests have been made. It drilled sandy lime showing oil in streaks from 9,030-58 ft., cored from 9,058-68 ft., recovering 3½ ft. sand with good odor, 1 ft. lime and green shale, 1½ ft. sand with good odor, and 1 ft. hard limy sand. It drilled hard white sand with streaks of saturation from 9,068-85 ft., and fine, crystalline, gray lime 9,085-98 ft., is drilling ahead below 9,115 ft. in sandy shale.

Kerlyn Oil Co. 1 Haye, wildcat 2 miles east of Gainesville, Cooke County, had no shows in Ellenburger lime topped at 3,835 ft. in going to total depth of 4,080 ft., but is setting casing to test shallow sands at 2,165-74 ft. and 2,178-90 ft. The Texas Co. 1 Beasley, Sivels Bend area wildcat which was completed flowing 152 bbl. in 8 hours through ½-in. choke, is producing slightly over 200 bbl. daily on ⅜-in. choke, from sand at 6,817-37 ft.

Ohio Oil Co. 1 Ross, recent Strawn lime discovery in eastern King County, took official potential test last week, gaging 165 bbl. oil in 3 hours through ½-in. choke, gas-oil ratio 258 to 1, gravity 36.9°, casing pressure 300 lb., tubing pressure 275 lb., from pay at 5,236-57 ft. Ohio 2 Ross, northeast of the discovery, is setting surface pipe at 1,750 ft.

Childress County received location for a 6,000-ft. wildcat 4 miles south of Kirkland at C. A. Beasley 1 W. T. Low, SW SW Section 417, W&NWRR Survey.

A 4,100-ft. wildcat will be drilled 2 miles southeast of Crews in northeastern Runnels County at Hunter & Hunter 1 J. T. Brandon, NW NW SE of the S. J. Lewis Survey.

NORTH CENTRAL TEXAS WILDCAT COMPLETIONS

Archer County: D. H. Bolin 1-J C. L. Abercrombie, S. Abercrombie Sur. A-752, 3 mi. W Archer City, dry, TD 1,377 ft.

Cooke County: Maguire Ind., Inc. 2 A. Hoenig, Jno. C. Morgan Sur., 3 mi. W and 2 mi. S Muenster, dry, TD 1,430 ft.

Trumpter Petroleum Co. 1 E. I. Cook, Wm. McClelland Sur. A-752, ½ mi. S Hood, elev. 965 ft., Ellenburger 1,418 ft., dry, TD 1,420 ft.

WEST CENTRAL TEXAS WILDCAT COMPLETIONS

Coleman County: States Oil Corp. I. R. M. Burroughs, 330 ft. from SL and 990 ft. from WL of SE/4 Sec. 3, Blk. 1, HT&B Sur., 1 mi. NE Silver Valley, elev. 1,924 ft., top pay 2,820 ft. in Morris sand, flowed 37 bbl. day through ¾-in. choke on 2-in. tubing, gas-oil ratio 1,830 to 1, gravity 43°, TD 2,852 ft.

Jones County: R. H. Roark 1 Sam Swan, J. Miley Sur. No. 281, 5 mi. SW Noodle, elev. 1,872 ft., Noodle Creek 2,501 ft., Swastika 3,229 ft., dry, TD 3,247 ft.

Shackelford County: Shell Oil Co., Inc. 1 K. F. Leschber, Sec. 34, Blind Asylum land, 4 mi. SE Albany, elev. 1,336 ft., Caddo 3,818 ft., Ellenburger 4,361 ft., dry, TD 4,427 ft.

Stephens County: Woodley Pet. Co. 1-B G. W. Thorpe, Sec. 456, 2 mi. SW Gunsight, elev. 1,484 ft., top pay 3,745 ft. in Mississippian, Ellenburger 3,974 ft., perforations 3,745-3,829 ft., flowed 45 bbl. day through open 2-in. tubing, gas-oil ratio 3,000 to 1, gravity 40.7°, TD 3,990 ft.

Check this
AMERICAN
cup and cone
AS shown below—the packing element is positively and evenly expanded horizontally against the casing by the cone! A perfect seal is assured—with no crushing of the cup! Also note (at left) the simple setting arrangement; extra large friction springs; large, carefully heat-treated slips; and large bottom guide!
TYPE G PACKER
AMERICAN
IRON AND MACHINE WORKS CO.
OKLAHOMA CITY, OKLAHOMA
Houston and Monahans, Texas; Harvey and New Iberia, Louisiana
Great Bend, Kansas. Export Office: 420 Lexington Avenue, New York City.
California Representative: Hopper Machine Works, Inc., Bakersfield, Cal.

MICHIGAN

New Coldwater Pool Placed on Proration

SAGINAW.—The expanding Isabella County Coldwater field went under proration January 15 by order of the state supervisor of wells and oil advisory board. The order limits withdrawals to 75 bbl. per well per day. The board also ordered a proration reduction to 150 bbl. per well per day in the Arenac-Deep River field.

Coldwater, a 1944 discovery field, now has about 25 producing wells, two more being added last week, one rated at 75 bbl. a day, the other having initial daily potential of 960 bbl. Two small wells in Holland Township, Ottawa County, and one in the Fillmore pool of Allegan were the week's other producer completions. Three of the four dry holes were wildcat tests.

New permits issued by the state conservation department numbered eight, two for extension tests in Colwater and one for a wildcat location in Rolland Township, Isabella County, other locations being in Arenac, Bay, Clare and Gladwin counties.

MICHIGAN WILDCAT COMPLETIONS

Gratiot County, New Haven Township: Sohio Petroleum Co. 1 Iva Barnes, C N½ NE NW 15-10n-4w, dry in Dundee, TD 3,257 ft.

Lake County, Sweetwater Township: C. L.

..AS SALES MANAGER I'M INTERESTED IN BETTER VALVE MAINTENANCE

. . *It means surer, quicker deliveries!*

I don't know much about valves — but I do know that when they leak, and must be repaired or replaced, things happen to production, and my deliveries go to pot!

Since our canny engineers ordered that Dexter Valve Reseating outfit we haven't had a single shutdown due to valve leaks. And, I understand that one man operating the Dexter can *reseat* a valve, *right on the line*, in a few minutes. It used to take a crew several hours — if they could repair the valve.

They tell me we're saving big money by cutting leak losses in steam, air, water and oil, too . . . thanks to Dexter.

20

Drop us a line . . .

giving your toughest valve-leak story . . . make, type, size and material . . . whether water, air or steam. We'll show you how to answer your problem with Dexter equipment.

A large part of our production facilities is devoted to war work. Orders for Dexter Machines and Cutters, from firms who want this economy and efficiency, have far exceeded our non-military manufacturing facilities. Please be patient — we will deliver just as quickly as possible.

DEXTER VALVE RESEATING MACHINES AND CUTTERS for Globe, Gate and Pump Valves

THE LEAVITT MACHINE COMPANY
ORANGE, MASSACHUSETTS

Maguire, Inc. 1 E. G. Thompson, S½ SE SE 24-18n-14w, dry in Dundee, TD 2,942 ft.

Montmorency County, Avery Township: Ralph McLellan 1 W. and Ida Miller, SW SW NW 10-30n-3e, dry, TD 2,550 ft

OKLAHOMA

West Edmond May Be Extended 5 Miles South

THE much discussed Phillips Petroleum-Kerlyn Oil Co. 1 Classen, NW SE 22-12n-4w, southeast of Bethany in western Oklahoma County, is showing signs of making a big well in the Bois d'Arc section of the Hunton lime. Some geologists insist that there is no indication of any separate structure, leaving a strong possibility that if successful, the territory between the present south limits of the West Edmond field and the Classen test will be productive. This would give the West Edmond field a 5-mile south extension.

Casing has been perforated at 7,154-7,200 ft., in the Bois d'Arc, with 184 shots and when the crew started to run tubing after the perforating, the mud began heaving. The well was killed to change connections. Shut-in pressure on casing and tubing is reported at 600 lb.

Oklahoma County.—Gulf Oil Corp. 1 Beck, SW SW SW 15-14n-2w, east of the Northeast Edmond pool, after failing in the second Wilcox, plugged back and perforated opposite the Hunton lime with 150 shots at 5,824-49 ft., and had about 10 ft. of oily mud in the hole.

Cimarron County.—Pure Oil Co. 1 Rose, SE NE SW 26-6n-8ecm, north of Keyes, tested 19,000,000 cu. ft. of gas per day from pay at 4,708 ft., after plugging back from 5,550 ft. This is the second large gas well for Pure on a block of over 60,000 acres and indicates, either a separate and large gas field, or a very large extension to the Hugoton field.

Cleveland County. — The O. G. Harp Poultry & Egg Co. 1 Mattheson, NE NW NE 19-10n-2w, which showed for a very large well in the Bartlesville, then performed eratically and went dead, has apparently bridged. Crews are working to clean out a bridge about 25 ft. off bottom.

Magnolia Petroleum Co. 1 Anneler, SW NE 26-2n-1w, southeast of Lexington, was reported unofficially to be drilling below 7,000 ft., and to be nearing the first Wilcox.

Garfield County.—Cities Service Oil Co. 1 Mariner, NW NE NW 6-22n-3w, between the Garber field and the townsite, may be opening a new gas field. A drill-stem test in the second Wilcox indicated a flow of 8,000,000 to 10,000,000 cu. ft. per day. The well is contracted to the Arbuckle and may resume drilling.

Kiowa County.—The second well in the Pure Oil Co.'s new North Hobart pool, Pure 1 Hinton-B, SW NW NE 10-7n-7w, 10-acre east offset to the discovery, is dry. The well had sand at 1,785 ft., and drilled and cored to 1,812 ft., where drill-stem test showed 250 ft. of water and 20 ft. of oil-cut mud. The discovery well had sand at 1,728-56 ft., and flowed 60 bbl. per hour through tubing choke.

OKLAHOMA WILDCAT COMPLETIONS

Blaine County: Curtis Oil 1 Garver, NE NE SE 30-18n-11e, dry, TD 2,209 ft., Dutcher 2,137 ft.

Caddo County: Texas 1 Brown, NE SW NW 18-5n-11w, dry, TD 2,951 ft., Hunton 2,625 ft.

Cotton County: J. M. Jackson 1 English, SW SW SE 12-2s-11w, dry, TD 2,604 ft.

Garvin County: Sinclair Prairie 1 Mullinix, SW SE SW 6-3n-2e, dry, TD 3,720 ft., McLish 3,522 ft.

Kay County: Pure 1 Bessing, NE SE SE 32-27n-1e, dry, TD 4,137 ft., Arbuckle 4,008 ft.

Kiowa County: Pure 1 Hinton "A", SE NE NW 10-7n-17w, flowed 1,659 bbl. oil and no water from sand at 1,728-84 ft., gravity 37.6°, TD 1,784 ft.

Lincoln County: Herndon Drilling et al 1 Honeycut, SE SE NW 9-13n-3e, dry, TD 5,338 ft., second Wilcox 5,325 ft.

J. W. Sorrells 1 Sukovaty, SW SW SE 15-14n-3e, pumped 26 bbl. oil from pay zone 4,007-17 ft., TD 4,043 ft., Oswego 3,955 ft., Prue 4,007 ft.

Love County: Gulf 1 Benson, NE NW SW 29-7s-3w, dry, TD 4,832 ft., conglomerate 4,245 ft.

McClain County: Carter 1 Lamar Ranch, NE SW 28-8n-3w, dry, TD 10,884 ft., Trenton 10,475 ft.

McIntosh County: W. H. Pine, Adm. 1 Loar, SE SE SW 12-10n-13e, dry, TD 1,957 ft., Booch 1,695 ft.

Oklahoma County: Stanolind 1 State 51, NE SW 36-11n-4n, dry, TD 7,666 ft., Bartlesville 7,466 ft.

Osage County: Wilcox 1, NE SW SW 10-22n-8e, dry, TD 2,953 ft., Arbuckle 2,829 ft.

Sinclair Prairie et al 1, NE NE SE 31-25n-6e, dry, TD 2,914 ft., May 2,902 ft.

Pawnee County: Richard Hughes 1 Koler, NW SE 34-22n-3e, dry, TD 4,356 ft., second Wilcox 4,334 ft.

Pittsburgh County: Public Service 1 Van Hauser, NE NE NW 20-8n-14e, 2,000,000 cu. ft. gas from pay zone 3,476-3,655 ft., TD 3,902 ft., Gilcrease 3,474 ft.

Stephens County: Texas 1 Helm, SW SE NW 21-2n-8w, flowed 127 bbl. oil from sand at 4,971-5,014 ft., TD 5,018 ft.

Lundy & Shear 1 Yeager, NW NE SW 21-1s-8w, dry, TD 3,003 ft.

EASTERN TEXAS

Three Producers Enhance Winnsboro Pool Stature

DALLAS.—Gages on three new producers in the Winnsboro pool, Wood County, indicate growing importance of that area, where production is from the Rodessa section of lower Glen Rose. Hunt Oil Co. 1 Craddock perforated pipe at 8,164-88 ft. and flowed 106½ bbl. oil in 8 hours through 3/16-in. choke, gas-oil ratio 1,680 to 1, gravity 48.3°, tubing pressure 1,300 lb. Gulf Oil Corp. 1-A Petty perforated casing at 8,227-32 ft. and flowed 420 bbl. in 24 hours through ⅜-in. bottom and ¼-in. top choke, with gas-oil ratio 1,020 to 1. Amerada Petroleum Corp. 1 Gamblin flowed 136 bbl. in 24 hours with gas-oil ratio 8,770 to 1 through ¼-in. choke, from perforations at 7,845-62 ft., opposite Bacon lime zone. Amerada is starting its 2 Gamblin, 934 ft. north of the producer.

Woodley Petroleum Co. 1 L. J. Murray estate is a new Woodbine sand wildcat in southern Houston County in the John Durst Survey, approximately 10,500 ft. west and slightly north of the Woodbine failure completed recently at Ivy-Moran 2 Murray. Simmons and Graham 1 Willis, wildcat 4 miles northwest of Lovelady, has been stopped at 3,312 ft. with no shows found.

In the South Tyler area of Smith County, Phillips Petroleum Co. 1 Englander, about 4 miles southeast of the discovery, is coring below 9,600 ft., and Phillips 1 Grelling, ½ mile northwest of the discovery, has resumed drilling after cleaning up a long fishing job at 8,550 ft. Other wildcats in the district which are at or near critical depths include Humble Oil & Refining Co. 1 Searcy, Titus County, drilling at 11,266 ft. in sandy shale; same company's Shelby County wildcat, 1 Pickering Lumber Co., drilling 6,982 ft. in lime; Cockburn Oil Co. 1 H. C. Cockburn, Falls County, preparing to run electric log at 6,250 ft.

Ohio Oil Co. 1 V. Popper is reported as a proposed 10,000-ft. Smackover lime wildcat 2½ miles southeast of Cash in Hunt County, in the O. M. Roberts Survey. Sinclair Prairie Oil Co. 1 Shofner, projected 13,000-ft. Smackover lime test in the Chapel Hill field, Smith County, is past 5,700 ft.

CALIFORNIA

Gas Pool Discovery Probable at Kirby Hills

LOS ANGELES.—Shell Oil Co., Inc. may have discovered a new commercial gas field in the Kirby Hills district of Solano County by completing 1-A Lambie flowing 3,980,000 cu. ft. of dry gas per day from 2,320 ft. Location has been made for 2 Lambie in 30-4n-2e. The Kirby Hills area is relatively close to gas transmission facilities and will undoubtedly be connected if subsequent wells confirm commercial indications.

Barnsdall Oil Co. has apparently found a new deep zone in the Newhall Potrero field although no formation test has yet been made. The amount of oil sand cored, however, indicates the probability of a new highly productive horizon at 9,670-10,400 ft. The company is drilling ahead to test the Sesnon zone. Deep zone prospects of this field have been regarded as unusually favorable and the deep test now being drilled to confirm earlier opinions. There is no reason why there should not be at least another productive zone below the present sand as the Miocene is exceptionally thick in this region and, with the Eocene productive at Aliso Canyon, these lower rocks also offer good prospects. If Barnsdall completes a good flowing well at 44 Rancho San Francisco deep drilling would follow probably at the south end of the structure where General Exploration Co. has developed small production in the Miocene on the southeast plunge of the structure.

Superior Oil Co. decided to proceed with development of its Houchin and Anderson properties along the north flank of the structure. General Petroleum Corp. has been experiencing mechanical trouble with 58-28 Benco, west of Superior's new locations in 35-31s-26e, but appears to have corrected conditions. A hole was found in 7-in. casing cemented at 11,313 ft. but this was remedied by cutting and removing the upper 4,000 ft. and running a new section with adapter at 4,004 ft. Completion of this well will increase General Petroleum's participation in the unit plan of operation and will also increase Union's participating acreage. Ohio Oil Co. has increased its participating acreage in recent months by completing new wells outside the western line of the unit plan.

Western Gulf Oil Co. has recompleted its discovery well in the Bakersfield Sewer Farm district of Kern County. The next well or two should reveal the importance of this area from a production standpoint as the discovery well may be an edge producer.

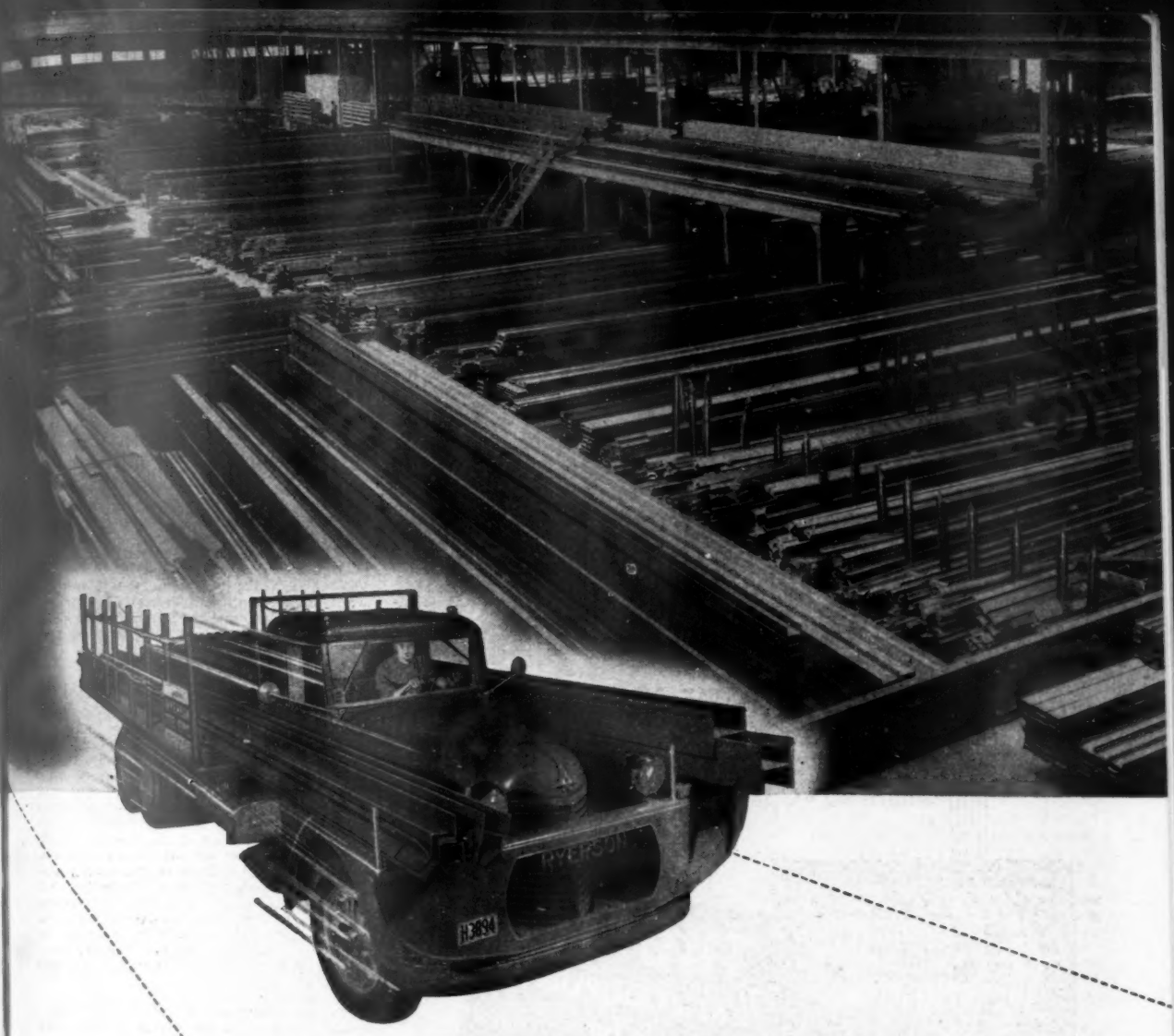
CALIFORNIA WILDCAT COMPLETIONS

Solano County, Kirby Hills district: Shell 1-A Lambie, 25-4n-1w, flowed 3,980,000 cu. ft. gas, no oil, 32/64-in. bean, pressures 650/930 lb., TD 2,320 ft., perf. 2,283-2,318 ft., Kirby Hills sand, Eocene age.

Los Angeles County, Newhall Potrero: Standard of Calif. 3-2 N. L. & F., 19-4n-17w, dry, TD 6,084 ft.

Kern County, Blackwells Corner: Atlas Prod., Inc. 1 Ellis, 19-26s-19e, dry, TD 1,120 ft.

Round Mountain: General Petroleum Corp. 2 Tarabino, 5-29s-29e, dry, Vedder sand of Miocene age was absent, TD 3,180 ft.



STEEL of every kind delivered QUICKLY from STOCK

Ryerson service to the oil industry includes

Bars, structurals, plates, sheets, tubing, drill rod, shafting, alloys, tool steel, Allegheny stainless, Ryex expanded metal, Inland 4-Way floor plate, welding rods, etc.

Write for a Ryerson Stock List.

Your nearby Ryerson plant carries large stocks of practically every kind of steel you need. Ready for quick shipment are more than 10,000 kinds, shapes and sizes — everything from structurals to stainless — from tiny rivets to 10" rounds.

Modern, precision shears — hack saws — punching and flame-cutting equipment, manned by expert Ryerson operators, will prepare steel to your exact specifications. And our entire organization is geared to getting your steel delivered in the shortest possible time.

We'll gladly work with you on any problem of steel supply, application or fabrication. Put Ryerson stocks and skill to work for you next time you need steel.

RYERSON STEEL

Joseph T. Ryerson & Son, Inc., Steel-Service Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

APPALACHIAN FIELD

Ohio Oil Stops Maryland Test in Igneous Rock

PITTSBURGH. — Suspension of drilling at 5,568 ft. in Ohio Oil Co.'s Maryland wildcat test near Salisbury in Wicomico County, after logging igneous rock at 5,529 ft., featured exploratory operations last week in the eastern states. Stanley B. White, Ohio Oil Co. geologist, announced that no showings had been logged. The Salisbury district failure is the first conclusive wildcat drilled along the eastern coastline following a leasing campaign which has been in progress nearly 3 years.

A new oil pool is indicated in Wood County, West Virginia, with the completion of the second test on Delsie Mellinger farm in Union district which is showing for 20 bbl. a day and 250,000 cu. ft. gas from the Berea at total depth of 2,211 ft.

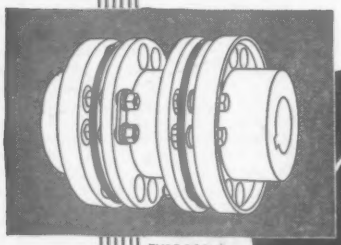
Columbian Carbon Co. extended the Injun sand gas pool in Union district, Kanawha County, with completion of a well on the B. F. High farm which gaged 747,000 cu. ft. of gas. The Big lime was logged at 1,468 ft., Injun 1,633 ft., gas 1,637-39 ft., rock pressure 660 lb., 60 hours, total depth 1,640 ft.

In Fayette County, southwest Pennsylvania, the east flank wildcat of New Penn Development Co. et al 1 J. P. Thompson on Chestnut Ridge in Wharton Township, drilled through the Oriskany sand into the Helderberg lime and at 7,799 ft. it was void of showing and low on structure compared with the crest and west flank tests.

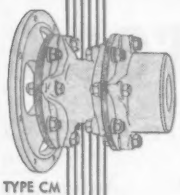
The deep test of The Texas Co. on J. E. McCullough farm in Cross Creek Township, Washington County, is shut down at 4,307 ft. waiting on a heavier rig to drill to the Oriskany and below.

THOMAS
Flexible COUPLINGS

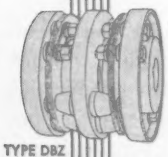
FOR HOT OIL PUMP DRIVES or any other service where 100% Operating Efficiency is demanded



TYPE DBZ-C



TYPE CM



TYPE DBZ

THOMAS Flexible COUPLINGS provide for Angular and Parallel Misalignment as well as Free End Float . . . and Eliminate BACKLASH, FRICTION, WEAR and CROSS-PULL

NO LUBRICATION IS REQUIRED!

The Thomas All-Metal Coupling does not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.

Write for Complete Engineering Catalog!

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

ILLINOIS

1,000-Bbl. McClosky Well For Bennington Pool

CENTRALIA.—An old well deepened to the McClosky lime in the Bennington pool, which came in flowing at the rate of 1,080 bbl. of oil per day after a 2,250-gal. acid treatment, was the best well of the week for Illinois. Burr Lambert 1 Nellie Van Schoick, NW SE NW 18-1n-10e, elevation 394 ft., was completed as a 25-bbl. well in the Aux Vases at 3,140-69 ft., in February 1943. Recently it was deepened to the McClosky and found pay zones in that formation at 3,217-30 ft., and 3,231-45 ft. After two acid treatments, the well started flowing.

N. V. Duncan, Inc., and Ashland Oil & Refining Co. 1 Schroeder-Kleinschmidt, SE NE NE 27-2s-14w, a northeast outpost well about 1 mile northwest of Cowling, had McClosky lime at 2,930-35 ft.; on drill-stem test, had gas in 5 minutes and natural flow of clean oil in 35 minutes. Casing is being set and the well looks good for about 250 bbl. per day.

Field activity picked up last week with 50 completions, including 11 wildcats, only 1 of which produced oil; while 26 of the 39 field wells were oil producers. New operations started totaled 39, including 7 wildcats. Clay County drew two new wildcats, Kingwood et al 1 Klinger, NW NW NW 31-5n-9e, and Pure Oil Co. 1 Moseley "B," SW SE SW 11-2n-8e; Franklin County had one new start, C. E. Brehm 1 U. S. Coal & Coke, NW NE SE 27-5s-4e; Hamilton County one, National Associated Petroleum 1 Good, SE NE NE 20-3s-6e; Jefferson County one, Fox & Fox 1 Interstate Coal, SW SW SW 4-4s-2e; Macoupin County one, J. Q. Gill 1 Parker, in NE 21-10n-9w; and Wayne County one, Pure Oil Co. 1 Grubb "A," SW SE SW 4-1s-8e.

ILLINOIS WILDCAT COMPLETIONS

Clinton County: Goldschmidt & Scherman 1 Bergman, SE SE NE 30-1n-3w, dry, TD 990 ft., Glen Dean 745 ft., Cypress 948 ft., Weiler 972 ft.

Jefferson County: K. M. Boyer 1 Telford, NE NW NE 4-1s-1e, dry, TD 2,305 ft. Menard 1,532 ft., Cypress 1,934 ft., Benoist 2,070 ft., Aux Vases 2,154 ft., Fredonia 2,299 ft.

Effingham County: Magnolia Petroleum 1 Yagaw, NW NW SW 9-7n-4e, dry, TD 2,281 ft., Menard 1,516 ft., Glen Dean 1,712 ft., Cypress 1,861 ft., Benoist 1,998 ft., Aux Vases 2,064 ft., Ste. Genevieve 2,113 ft.

Fayette County: S. H. Leavitt 1 Fundaburks, NW SW SE 19-8n-1e, dry, TD 1,756 ft., Menard 1,128 ft., Cypress 1,442 ft., Benoist 1,564 ft., Aux Vases 1,594 ft., Fredonia 1,680 ft.

Gallatin County: Carter Oil 1 Hale, NW SW SW 22-7s-9e, dry, TD 3,104 ft., Menard 2,138 ft., Benoist 2,834 ft., Aux Vases 2,931 ft., McClosky 3,005 ft., St. Louis 3,090 ft.

Hamilton County: National Associated 1 McElvaine, SE NE SE 7-5s-7e, dry, TD 3,660 ft.

Sinclair-Wyoming Oil 1 Summitville Bank, SE NW SW 13-4s-6e, dry, TD 3,551 ft., Weiler 3,056 ft., Benoist 3,184 ft., Aux Vases 3,207 ft., McClosky 3,367 ft., St. Louis 3,541 ft.

Jasper County: Myers & Wilson 1 Miller, SE SW NE 32-7n-10e, dry, TD 2,860 ft. Menard 2,125 ft., Cypress 2,543 ft., Benoist 2,655 ft., Aux Vases 2,743 ft., McClosky 2,823 ft.

Jefferson County: F. Strickland et al 1

ALWAYS READY FOR OIL FIELD EMERGENCIES
HUNDREDS OF THOUSANDS in Daily Use!

IDEAL *Rechargeable*
Flashlight STORAGE BATTERY

. . . and here's why:

BRIGHTER Always a "like new" battery;
STEADIER No gradually fading light!
LONG LIFE Recharged regularly, can outlast 400 dry cells.
ECONOMICAL Can save up to $10 a year per flashlight.

Fits standard flashlight cases; takes place of two 1¼" size D dry cells.

GUARANTEED

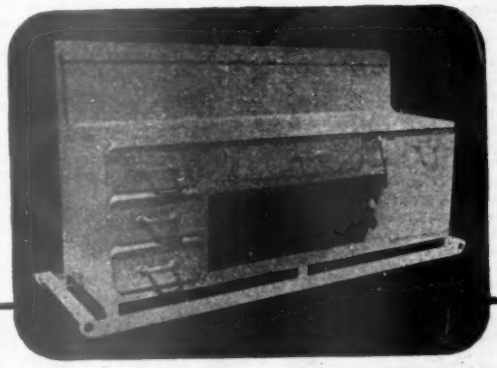
I D E A L Battery chargers plug into any electrical outlet. Also available for connecting to automobile ignition.

PROMPT DELIVERY

Write for Bulletin BB 444

IDEAL *Sycamore*

IDEAL COMMUTATOR DRESSER COMPANY
1522 Park Avenue ★ Sycamore, Illinois
Sales Offices in all Principal Cities.
In Canada: Irving Smith, Ltd., Montreal, Quebec



The Industry's Finest
WORK BENCH

The Owen Tool Chest and Work Bench is standard equipment on modern drilling rigs. Built of 3/16" steel, welded throughout and mounted on skids, it is very sturdy . . . will withstand many moves and hard use. The roller mounted drawers have a central locking system. Rain hood over each drawer protects tools against rain damage. Sturdy vise stand conveniently located.

Dimensions: back height 4½'; front height 32"; depth 30"; length 8'; approximate weight 1100 lbs.

OWEN TOOL CO.
1825 WASHINGTON AVE. — CAP. 0211
HOUSTON 10, TEXAS

Goulds
the PUMP FOR the JOB

Selected from a Complete Line to meet your Requirements

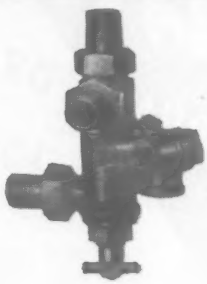
YOU can make your task easier, if it involves the planning of liquid handling, by turning that job over to Goulds.

Intensive experience during the war period in supplying pumps for every type of liquid handling service, plus a background of 96 years in pump design and building enables Goulds to solve the most difficult pumping problems.

Goulds pumps in the pipe line and refinery fields are proving, by performance, that experience counts. Let Goulds engineers assume your liquid handling burdens. Let them select from Goulds complete line of centrifugal, rotary and reciprocating pumps, the pumps to meet your requirements.

Goulds PUMPS INC.
SENECA FALLS, N. Y.

PENBERTHY
AUTOMATIC
INJECTORS



The accepted method for assuring an uninterrupted supply of feed water to oil field boilers. Penberthy Automatic Injectors will supply feed water to boilers at minimum cost, are quickly and easily installed, reliable under most severe operating conditions, require little attention and no careful handling. Highest quality design and rugged construction.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

SATISFACTORILY
SUPPLYING
Pipe Line Engineers and Contractors
with their
BURLAP and COTTON BAG
REQUIREMENTS
Central Ohio Bag & Burlap Co.
Columbus 8, Ohio
550-58 North Fourth
Adams 8888
Adams 1344
A. A. MICHAELSON
Proprietor

OIL AND GAS LAW LECTURES SERIES TO OPEN AT Y.M.C.A. LAW SCHOOL

The South Texas School of Law's tenth annual series of oil and gas lectures, in which instruction is given along practical, non-technical lines, will be offered on January 18th to May 10th.

Some of Houston's most prominent lawyers will give the lectures at the night school operated by the Y.M.C.A., according to W. H. Randolph, educational director. They will discuss such phases of the industry as leases, royalties, operating agreements, governmental regulations and operating rights.

The course is open to both men and women. The public is invited to attend the first lecture, which will be held on the second floor of the Y.M.C.A., 1600 Louisiana Street, Houston, Texas, on Thursday, January 18th from 7:30 to 9:30 p. m.

Boles, NW SE NE 7-1s-2e, dry, TD 2,383 ft., Menard 1,634 ft., Cypress 2,082 ft., Benoist 2,211 ft., Aux Vases 2,283 ft., Ste. Genevieve 2,370 ft.

Madison County: Rockhill et al 1 Bicker, NW SW SE 3-4n-6w, 52 bbl. oil, TD 1,775 ft., Devonian 1,738 ft.

Washington County: Goldschmidt & Scherman 1 Frank, NW NW SE 7-1s-3w, dry, TD 1,200 ft., Glen Dean 834 ft., Cypress 1,027 ft., Benoist 1,161 ft., Benoist sand 1,175 ft.

TEXAS GULF COAST

New Deeper Sand Opened At Silsbee Field

HOUSTON.—Glenn H. McCarthy 1 Ida Dudley Wilson et al, wildcat about 5.7 miles northwest of Angleton, in Brazoria County, is flowing oil, a little mud and sand, no salt water, into pits on drill-stem test, through perforations at 8,698-8,714 ft. No accurate estimate is available. There is no tankage at the lease. Total depth of the hole is 10,806 ft.

Humble Oil & Refining Co. 1 Schmidt, a new sand discovery on south flank of Danbury Dome, Brazoria County, flowed Railroad Commission potential of 312 bbl. daily through ¼-in. choke, tubing pressure 550 lb., gas-oil ratio 730 to 1, gravity 33.2°, trace of water. It is completed in 56 perforations at 7,542-56 ft., with 2½-in. tubing set at 7,491 ft.

Phillips Petroleum Co. 1 Mrs. Lula Allen, at Chocolate Bayou field in Brazoria County, reports a gage of 172 bbl. condensate per day with 4,928,000 cu. ft. gas through ⅞-in. choke from perforations at 11,470-80 ft., tubing pressure 3,450 lb., gas-oil ratio 28,651-1, gravity 48.2°, no water. Total depth is 11,500 ft., with 5½-in. casing at 11,491 ft. Open flow 35,000,000 cu. ft. gas a day.

Westland Oil Corp. and Ralph Walton 1 Julia Tague, in the Manuel Escalera Survey, Abstract 170, just across Highway 6 from Arcola townsite, in Fort Bend County, is dry, with nothing of interest found. Total depth, by measurement, is 6,290 ft., driller's total depth 6,265 ft.

Ohio Oil Co. 2 A. W. Pietz, at North Markham field in Matagorda County, flowed a Railroad Commission potential of 203.08 bbl. daily through ⅛-in. choke from 23 perforations at 7,714-20 ft., tubing pressure 1,090 lb., casing pressure 1,250 lb., gravity 35° no water, gas-oil ratio 475 to 1. Total depth is 8,125 ft., top of sand 7,714 ft.

Cities Service Oil Co. 1-C Frank Stephens, 3,551 ft. southwest of the Ramsey field discovery well, Colorado County, is testing for final completion in perforations at 8,948-80 ft. On one test it flowed at the rate of 2,373,000 ft. gas and 29.4 bbl. per million feet of gas per day through 12/64-in. choke, tubing pressure 3,150 lb. Total depth is 9,028 ft. 7-in. casing set at 9,025 ft.

American Republics Corp. and Houston Oil Co. of Texas 10 Brooks League-Fee, which opens a new deeper sand at Silsbee field in Hardin County, flowed a Railroad Commission potential of 468 bbl. per day on ¼-in. choke, gas-oil ratio 577 to 1, from 24 perforations at 7,455-60 ft., tubing pressure 800 lb., gravity 43.8°, no water. Total depth is 8,905 ft., top of sand 7,432 ft. This was a deepening job.

UPPER GULF COAST WILDCAT COMPLETIONS

Brazoria County: General Crude Oil Co. 4 Belle H. Wisdom, Damon Mound area, ½ mile west of Damon City, dry at 4,042 ft.

Brazoria County: Salt Dome Oil Corp. et al 1 F. P. Law et al Unit, HT&B Sur., 4 miles southeast of Fresno, dry at 8,014 ft.

Fort Bend County: J. M. McDade 1 William Brinkmeyer, 4 miles northwest of Needville, in H&TC Sur., dry at 6,137 ft.

Fort Bend County: L. H. Wentz Oil Division 1 J. R. Farmer, 3.3 miles southwest of Clodine, I&GN Sur., dry at 8,293 ft.

Fort Bend County: Westland Oil Corp. & Ralph Walton, Arcola area, Manuel Escalera Sur., dry at 6,290 ft.

SOUTHWEST TEXAS

New Fields Named by Geological Society

CORPUS CHRISTI.—Humble Oil & Refining Co. 1 Juana Y. McDermott, new discovery, 25 miles north of Roma, in Zapata County, in Sernardo Gutierrez Porcion 14, flowed on 24-hour potential test 19.3 bbl. fluid, 72 per cent water, 5.5 bbl. oil, ⅛-in. choke, tubing pressure zero, casing pressure 140 lb., from perforations at 2,509-18 ft. Total depth is 7,004 ft.

H. R. Smith and W. C. McBride, Inc., 1-C Rivers, in Brayton field, Nueces County, flowed on 24-hour potential test 163 bbl. through 9/64-in. choke, tubing pressure 825 lb., casing pressure 1,375 lb., no water. Gas-oil ratio 780 to 1, gravity 39°, from 12 perforations at 7,196-7,202 ft. Total depth is 7,202 ft. with 5½-in. casing set on bottom.

Earl H. Smith 1 R. H. and Ella McCampbell, wildcat, 12 miles south of Hebbronville, in Las Uinoritas grant, Abstract 226, Jim Hogg County, is running electric log at 4,750 ft. and may take side-wall cores in sand with oil odor at 4,369½-74 ft.

Sohio Petroleum Co. and Wiggins & McFerron 1 Albert J. Albrecht, wildcat, 15 miles westerly from Victoria, in Victoria County, in the Cecelia de la Garza Survey, blew out when coming out of hole at 4,213 ft. It was put under control and is drilling ahead from 4,274 ft. The last electric log run in this hole was at 4,005 ft. which showed kicks in the Catahoula and Frio sands.

The South Texas Geological Society has announced the following new field names: The name "Irving" has been given the field discovered by George Irving 1 M. M. Garcia, Porcion 90, Starr County. The name "Raymondville" has been given the field discovered by The Texas Co. 2 Yturria Bros. Land & Cattle Co., San Juan de Carricitos grant, Willacy County.

SOUTHWEST TEXAS WILDCAT COMPLETIONS

Bastrop County: Federal Royalties Co., Inc., 1 Andy Alexander, 3 mi. W of Cedar Creek, in Jesse Billingsley Sur., dry at 1,841 ft.

Cameron County: R. T. Wilson 1 Bentsen Bros., 2½ mi. NE of Monte Grande, in Esperitu Santo grant, dry at 10,120 ft.

Duval County: Tom Graham 1 J. T. Dinn, 8¼ mi. NE of Bruni, N. K. Allison Sur. 2, dry at 3,450 ft.

Goliad County: Lewis Lawlor 1 J. G. Wickheimer, 3 mi. SE of Fannin, Cuadrilla Irrigation Co. Sur., dry at 4,860 ft.

Jim Hogg County: Delk Investment Co. 1 E. L. Armstring, 6 mi. SW of Hebbronville, in Sur. 107, dry at 3,636 ft.

Jim Wells County: H. H. Howell 1 L. E. Thompson, 7 mi. SE of Alice, in Los Presenos grant, dry at 6,155 ft.

Karnes County: Lewis Lawlor 1 Gus A. Johnson, 5 mi. SW of Kenedy, in Carlos Martinez grant 1, dry at 6,270 ft.

Southern Minerals Corp. 1 Joe F. Bartosch, Falls City discovery, 1 mi. N of Falls City, in Louis Manchaca Sur.,

TD 4,711 ft., perforations 4,651-54½ ft., PT 59.63 bbl. per day fluid, ⅞-in. choke, gravity 45.6°, 6,770 ft. fresh water.

Live Oak County: The Texas Co. and Henderson Coquat 1 Mrs. J. K. Cochran, 5 mi. E of Oakville, in J. C. Wright Sur., dry at 8,409 ft.

Nueces County: Southern Minerals Corp. 1 T. G. Winston, 5 mi. E of Driscoll, Roberts & White subd. of Petronilla Ranch, dry at 7,510 ft.

Starr County: W. D. Kennard 1 Anna M. Kelsey, 10 mi. NW of Sullivan City, in Por. 87, dry at 2,646 ft.

Sun Oil Co. 1 M. S. de Flores et al, Por. 40, 18 mi. E of Rio Grande City, dry at 5,440 ft.

McMullen County: The Texas Co. 1 Carrie Aguilare, 10 mi. SW of Tilden, in Nicholas Salinas Sur., dry at 972 ft.

SOUTH LOUISIANA

Union Sulphur Opens New Field in Acadia Parish

NEW ORLEANS. — Union Sulphur Co., Inc., has opened a new oil field in Acadia Parish at the 1 Medlenka, Section 11-8s-2w, Iota prospect. Total depth is 9,692 ft. with 7-in. casing set at 9,692 ft. On 26-hour drill-stem test at 9,664-72 ft. it recovered 75 bbl. oil, 31° gravity. This test picked up a sand showing oil at 9,380-90 ft. and another sand at 9,664-80 ft. Pipe was perforated with 40 shots from 9,664-72 ft. and with 16 shots from 9,672-76 ft., tubing and packer set at 9,600 ft. Well is now cleaning into pits through 15/64-in. choke with tubing pressure 200 lb.

Pure Oil Co. 2 Benoit Unit, Section 5-12-2w southeast flank of the West Gueydan dome, Vermilion Parish, is completed in perforations from 10,060-70 ft., with 2½-in. on packer at 10,011 ft., flowing 168 bbl. daily through 7/64-in. choke, 38.1° gravity oil. Total depth is 10,772 ft. with 5½-in. casing set on bottom. This is a new sand for this field. Pure 1 Benoit Unit, same section, was completed early in November on this same flank, flowing 213 bbl. daily on ⅛-in. choke, 36.9° gravity oil, from perforations at 9,619-23 ft.

Humble Oil & Refining Co. 2 M. L. Vincent, Jr. et al, North Tepetate field, Acadia Parish, is completing in perforations at 7,803-7,806 ft., flowing 6.23 bbl. hour through ⅛-in. choke, gas-oil ratio 1,660 to 1, tubing pressure 1,800 lb., gravity 36.6°. Total depth is 8,650 ft. with 7-in. casing set at 8,648 ft. The well is still testing.

Magnolia Petroleum Co. 4 R. A. Moore, Section 13-12s-12w, Gum Cove field, Cameron Parish, is completed and flowed 125 bbl. daily on 7/64-in. choke from perforations at 8,646-50 ft., 450,000 cu. ft. gas per day, gas-oil ratio 3,690 to 1, gravity 54.4°. Total depth is 10,015 ft. with 7-in. casing set near bottom.

Phillips Petroleum Co. 1 Mermentau, in Section 17-14s-5w, at Catfish Lake, Cameron Parish, is dry at 10,022 ft., with no shows of interest reported.

Sun Oil Co. 7 Belle Isle Corp., Section 1-18s-10e, at Belle Isle, St. Mary Parish, on recent gage, flowed at rate of 227 bbl. daily through ⅛-in. choke from perforations at 8,248-70 ft., gas-oil ratio 482 to 1, tubing pressure 1,200 lb., gravity 33.6°, no water. This is a new producing level for the field. Although this well was brought in in December the company has been running tests with some improvement in the flow.

SOUTH LOUISIANA WILDCAT COMPLETIONS

Cameron Parish: Phillips Petroleum Co. 1 Mermentau, Catfish Lake, Sec. 17-14s-5w, dry at 10,022 ft.

Livingston Parish: Louisiana Land & Exploration Co. 1 Livingston Lumber Co., Sec. 45-7s-3e, dry at 9,240 ft.

Terrebonne Parish: Louisiana Land & Exploration Co. 1 State-Pelican Lake, Lse. 581, Twp. 23s-16e. Dry at 12,457 ft.

CANADIAN FIELDS

Jumping Pound Well Tests Gas and Naphtha

CHATHAM, Ont. — On the Jumping Pound structure west of Calgary, continuation of production tests at Shell Exploration Co. 4-24-J, LSD 4, 24-25-5w5, indicates a moderate gas and naphtha producer. Bottomed at 9,947 ft. with Madison contact at 9,618 ft., experiments with varying back pressures after final acidization showed 7,650,000 cu. ft. of gas through 30/64-in. choke with 1,700 lb. back pressure on tubing. Naphtha recovery was 93 bbl. with 4 bbl. of water, believed from spent acid. The naphtha is 51.2 gravity. Plans are being made to drill additional wells on the flanks of the structure, using residual gas as fuel.

Turner Valley.—In the Turner Valley north extension, Foothills Oil & Gas 20, LSD 14, 4-21-3w5, is testing at 8,185 ft. The well had the main unlift Madison at 6,763 ft., returning to Fernie at 7,330 ft., and encountering the eastside lime block at 8,162 ft.

Outpost well.—North and west of the Turner Valley producers, Boaventure Royalties 1, LSD 16, 24-21-4w5, has been abandoned. Drilling was discontinued at 9,643 ft. without reaching the Madison but the

Changed your ADDRESS?

If you have moved and have not notified THE OIL AND GAS JOURNAL, please use this form so we can get your copies to you promptly.

NAME .....

OLD ADDRESS .....

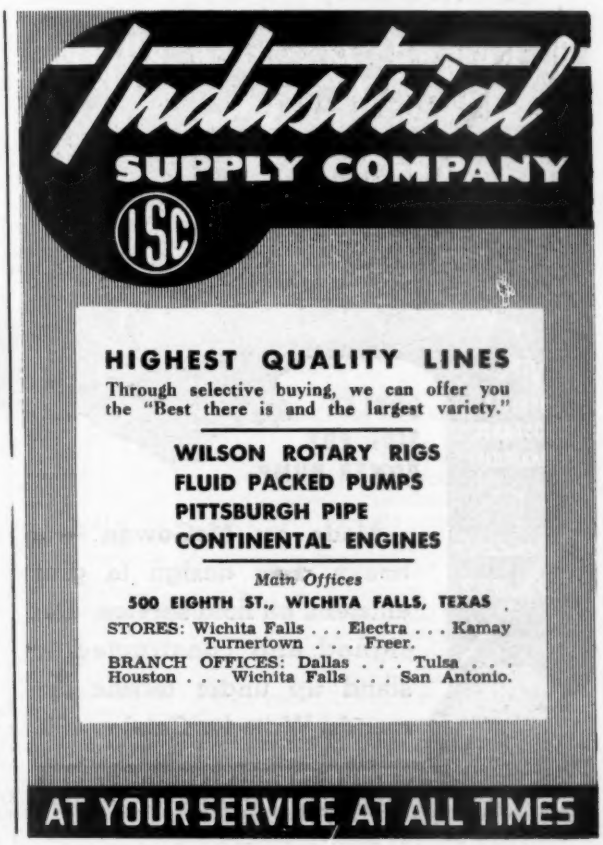
.....

NEW ADDRESS .....

.....

COMPANY ..... TITLE .....

Mail to: Circulation Department, The Oil and Gas Journal, Tulsa 1, Oklahoma


Industrial
SUPPLY COMPANY
ISC
HIGHEST QUALITY LINES
Through selective buying, we can offer you the "Best there is and the largest variety."
WILSON ROTARY RIGS
FLUID PACKED PUMPS
PITTSBURGH PIPE
CONTINENTAL ENGINES
Main Offices
500 EIGHTH ST., WICHITA FALLS, TEXAS
STORES: Wichita Falls . . . Electra . . . Kamay Turnertown . . . Freer.
BRANCH OFFICES: Dallas . . . Tulsa . . . Houston . . . Wichita Falls . . . San Antonio.
AT YOUR SERVICE AT ALL TIMES

hole was plugged back to test light oil shows in the Dalhousie sandstone at 9,075-9,225 ft. Efforts to develop commercial production were unsuccessful.

North Turner Valley.—In North Turner Valley, Foothills Oil & Gas 19, LSD 10-11, 27-20-3w5, has been completed for 480 bbl. daily from Madison limestone at 6,059-9,023 ft.

Vermilion.—In the Vermilion field, Great Bend Oils 2, LSD 2, 29-50-5w4, finished at 1,793 ft. is pumping around 50 bbl. daily of 14-gravity oil. Sweet Grass 2, LSD 3, 29-50-5w4, has around 30 bbl. at about 1,800 ft.

Lloydminster.—In the Lloydminster field, western Saskatchewan, Community Services 1, LSD 12, 24-49-28w3, is gun perforating gas horizons at 1,694 ft. with a good producer indicated.

LA.-ARK.

Disappointments in New Delhi Area

SHREVEPORT.—Three tests drilling in the general area of the recent Delhi discovery in Richland Parish of the Murphy-Sun Oil Co. 1 Holt, in NW NE 21-17n-9e, are disappointments. H. L. Woods 1 Mulholland, SE NE 20-17n-9e, cored salt water at 3,250-60 ft., and is drilling at 3,455 ft. in lime. Roy L. Fisher 1 Graham Unit, in 13-17n-9e, is dry at 3,316 ft. total depth. W. C. Sharp et al 1 Cochran & Franklin, NW SE 14-17n-8e, is dry at 3,450 ft. total depth.

In Union County, Arkansas, Root Petroleum Co. 1 Union Sawmill, NW NW 27-18-12, near the town of Strong, is flowing 5 bbl. of oil per hour through a 12/64-in. tubing choke from total depth of 6,382 ft., apparently opening a new pool. The Salem Church condensate pool was defined on the northwest flank by a dry hole, Root Petroleum 1 Manning, NW SE SE 20-16s-18w, which is dry at 7,045 ft. total depth.

OHIO, KENTUCKY

Richville Gas Pool Gains South Extension

COLUMBUS.—Drilling operations have been reduced by 75 per cent in many parts of the state by excessive snowfall. Completions are and will continue at a reduced rate for the next 4 to 6 weeks.

Ed Obermiller 1 Monroe Whitmer, Section 12, Bethlehem Township, Stark County, a south extension to the Richville pool, gaged 594,000 cu. ft. natural from the Clinton at 4,558-75 ft., and was shut in at 1,247,000 cu. ft. after shot.

Industrial Gas Co. 1 Muskingum Gravel, Section 17, Springfield Township, Muskingum County, reached the Clinton at 3,509 ft. and had 570,000 cu. ft. of gas in the top of the sand when the rig burned down. Another rig will be built and the well completed.

The Texas Co. has drilled through the Clinton sand at 6,063-6,171 ft. in the deep wildcat in Stock Township, Harrison County, with no showings found. Drilling continues.

OHIO WILDCAT COMPLETIONS

Holmes County, Hardy Township: Kenova Oil & Gas 1 Lydia Miller, Sec. 4, Clinton 3,780-3,840 ft. and 3,850-55 ft., dry, TD 3,926 ft.

Lorain County, Huntington Township: Hanley & Bird 1 George Hawk, Lot 23, no sand, dry, TD 2,631 ft.

WESTERN KENTUCKY

OWENSBORO.—There were only three wells completed in Western Kentucky this week, after last week's spurt of eleven completions. In Daviess County, Reilly-Barnett 1 Tyler, NW 23-O-30, 7 miles southeast of Obo, elevation 401, was dry at total depth of 1,606 ft., after testing Glen Dean at 1,138 ft., and Ste. Genevieve at 1,475 ft. In Henderson County, Walter Sargent et al 2 Dugan, SW SW 20-P-27 was dry at total depth of 1,050 ft. In Webster County, Sinclair Prairie Oil Co. 1 Rakestraw, SE SE SW 15-M-24, was dry at 3,052 ft., total depth, after having a small show on drill-stem test in the McClosky at 2,908-26 ft., and getting a show of dead oil in the Cypress at 2,544-50 ft., and 2,560-79 ft.

WESTERN KENTUCKY WILDCAT COMPLETIONS

Webster County: Sinclair Prairie 1 Rakestraw, SE SE SW 15-M-24, dry, TD 3,052 ft., McClosky 2,908 ft.

Davies County: Reilly-Barnett 1 Tyler, NW¼ 23-O-30, dry, TD 1,606 ft., Ste. Genevieve 1,475 ft.

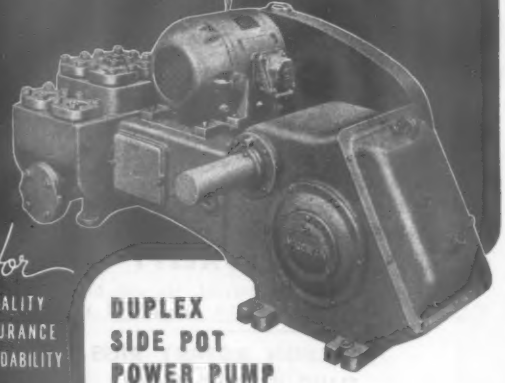
EASTERN KENTUCKY

ASHLAND.—Field activity has not yet recovered from the effects of bad weather and there were no completions this week. Some of the companies are busy repairing roads that were damaged during the recent storms.

INDIANA

EVANSVILLE.—There were only three completions this week, one oil well and two dry holes. Carter Oil Co. 2 Spencer, SE NW 1-7s-14w, after drilling to total depth of 2,026 ft., plugged back to 2,019 ft.,

McGOWAN *Precision* PUMPS



for QUALITY ENDURANCE DEPENDABILITY

DUPLEX SIDE POT POWER PUMP

Dependable Since 1852

Made by McGowan — a heavy duty design to give efficient, oil field service. Designed and constructed to stand up under terrific demands. Write for Catalog 200.

McGOWAN PUMPS

LEYMAN MANUFACTURING CORP.
The JOHN H. McGOWAN Co. DIVISION
59 CENTRAL AVE CINCINNATI 2, OHIO

SAVES MANPOWER!

Norris Clutch Type Valve Puller Eliminates Extra Pulling of Rods To Pull Lower Valve . . .

This is no time to *waste* precious manpower. This is an emergency that calls for the *conservation* of labor and the *saving* of time—and in pumping wells such a policy demands the use of the Norris Clutch Type Valve Puller. As part of your pumping string, this performance-proved device does *not* retard production or emulsify the oil. But it *is* ready at a moment's notice to pull the standing valve quickly, safely, positively, thus *saving* the extra run of the rods and the time and labor it involves. Desirable in peace, essential in war, it belongs in all pumping wells.

Norris Brothers, INC.
ROBINSON · ILLINOIS

and swabbed 228 bbl. per day from the Waltersburg, topped at 2,008 ft.

In Perry County, Sun Oil Co. 1 Gibson, wildcat test in SE SE SE 17-4s-12, elevation 735 ft., is drilling at 3,255 ft., after topping Trenton at 2,865 ft. In Posey County, Bristol Hackbusch 1 Goedde, wildcat in NE NE SW 24-5s-12w, elevation 533, is installing pumping equipment to test the Cypress at 2,363-78 ft., after drilling to total depth of 2,820 ft.

KANSAS

Field Operations and Test Activity in Slump

COMPLETIONS and field activity in Kansas are undergoing a mid-winter slump, with only 16 completions for the week, 7 of these being dry wildcats. Six pools had one oil completion apiece, and three field tries were dry. New locations announced total only 23, with three wildcat tests included. Locations for wildcats are in Barton, Graham, and Norton counties.

Raymond Gear et al 1 Carroll, SW NE SE 21-17-14w, north of the Boyd pool in Barton County, bottomed at 3,370 ft., and swabbed 1½ bbl. oil per hour for 24 hours, natural. The 5-inch pipe was set at the top of the Arbuckle, cut at 3,356 ft.

Harber Drilling Co. 1 Smith, SW SW SW 19-21-11w, in Stafford County, promises to be a producer. After drilling to 3,555 ft. in the Arbuckle, and acidizing with 500 gallons, 100 ft. of oil rose in the hole. After 1,500 gallons of acid, the well swabbed 5 bbl. oil per hour. Testing will continue. Tops are Topeka 2,785 ft., lime 3,196 ft., Springer 3,504 ft., Springer sand 3,516 ft., and Arbuckle 3,548 ft.

Panhandle Eastern Pipeline Co. 1 Waltner, SE SE SE 36-21-3w, 3 miles east of Hollow-Nikkel pool in McPherson County, has had slight oil stains in the Mississippi lime at 3,184-87 ft., 3,192-96 ft., and 3,205-07 ft. Operators are drilling ahead at 3,400 ft. Tops for the well are Brown Lansing 2,350 ft., White Lansing 2,400 ft., Base Kansas City 2,810 ft., Conglomerate 3,108 ft., and Mississippi lime 3,116 ft.

KANSAS WILDCAT COMPLETIONS

Cowley County: Zephyr Drilling and Deep Rock 1 Bossi, NE NW NE 13-35-4e, dry, TD 3,170 ft., Mississippi lime 3,156 ft.

Ellis County: Maguire Industries 1 Stecklein, SE SE NW 21-14-17w, dry, TD 3,572 ft., Arbuckle 3,516 ft.

Ellsworth County: Phillips 1 Betterbrock, SW NE NE 23-17-7w, dry, TD 3,777 ft., Arbuckle 3,747 ft.

Phillips 1 Shannon, SW SE NW 28-17-7w, dry, TD 3,524 ft., Arbuckle 3,494 ft.

Marion County: Texas 1 Schmidt, NE SW SW 31-20-3e, dry, TD 3,150 ft., Arbuckle 3,048 ft.

Sedgwick County: Beech Aircraft 1 Cox, NW SE NW 36-28-2e, dry, TD 3,026 ft., Mississippi lime 2,940 ft.

Stafford County: Sharon Drilling and Derby Oil 1 Krey, NW NW NW 25-23-11w, dry, TD 3,865 ft., Arbuckle 3,815 ft.

FOREST CITY BASIN

ST. JOSEPH, Mo.—Fell and Reid have spudded an Arbuckle lime wildcat test northeast of Parkville in C SE SE SE 19-51n-33w, Platte County, Missouri. Magnolia Petroleum Co. 1 National Life in SE SW NE 15-10s-19e, Jefferson County, Kansas, a wildcat about 5 miles southwest of the McLouth oil and gas field, was fishing at 2,149 ft. Viola lime was topped at 2,133 ft.

WILDCAT COMPLETIONS AND DISCOVERIES

	Week ended Jan. 13, 1945					Cumulative total, 1945				
	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ohio	0	0	0	2	2	0	0	0	2	2
Indiana	0	0	0	0	0	0	0	0	0	0
Illinois	1	0	0	10	11	4	0	0	15	19
Kentucky	0	0	0	2	2	1	0	0	4	5
Michigan	0	0	0	3	3	0	0	0	9	9
Kansas	0	0	0	7	7	1	0	1	15	17
Neb., Mo., Iowa	0	0	0	4	4	0	0	0	5	5
Oklahoma	3	0	1	14	18	3	0	1	14	18
Texas:										
North Central	2	0	0	5	7	2	0	0	13	15
West	0	0	0	4	4	1	0	0	4	5
Panhandle	0	0	0	0	0	0	0	0	0	0
Eastern	0	0	0	0	0	2	0	0	2	4
Gulf Coast	1	0	0	10	11	1	0	0	17	18
Southwest	0	0	0	7	7	0	0	0	11	11
Total Texas	3	0	0	26	29	6	0	0	47	53
Louisiana:										
Northern	0	0	0	0	0	0	0	0	1	1
Southern	0	0	0	3	3	0	0	0	3	3
Total Louisiana	0	0	0	3	3	0	0	0	4	4
Arkansas	0	0	0	0	0	0	0	0	2	2
Mississippi	0	0	0	5	5	0	0	0	5	5
Ala., Ga., Florida	0	0	0	1	1	0	0	0	1	1
Montana	0	0	0	0	0	0	0	0	0	0
Wyoming	0	0	0	0	0	1	0	0	1	2
Colorado-Utah	0	0	0	0	0	0	0	0	0	0
New Mexico	0	0	0	4	4	0	0	0	4	4
California	0	0	1	3	4	0	0	1	12	13
Total United States	7	0	2	84	93	16	0	3	140	159
Total previous week	9	0	1	56	66					

NEBRASKA WILDCAT COMPLETIONS

Garden County: Sinclair Prairie 1 Delatour, SW SW SW 33-19n-42w, dry, TD 5,446 ft.

Hitchcock County: Texas 1 Redmer, SW SW SW 35-2n-33w, dry, TD 4,704 ft., Basal sand 4,682 ft.

Texas 1 Franktaton, SE NW NW 22-2n-35w, dry, TD 4,667 ft.

Texas 1 Egle, SE SE SW 29-4n-35w, dry, TD 5,018 ft., Arbuckle 4,900 ft., granite 5,014 ft.

MISSISSIPPI

Clarke County Gets State Line Discovery

JACKSON.—A new shallow field in the southwest corner of Clarke County, about 6 miles east of the Gilbertown field in Alabama, is in prospect as Kirby Petroleum Co. 1 Long Bell, NW NW SW 30-1n-18e, prepared to install pumping equipment after swabbing clean oil from the Eutaw. This test was drilled to a total depth of 5,620 ft., testing the Massive sand, topped at 5,085 ft. It then plugged back and tested the Eutaw, topped at 3,647 ft. Final perforations are 3,650-60 ft., with 60 shots; 3,707-17 ft. with 60 shots; 3,729-39 ft. with 60 shots.

Gulf Refining Co. 1 Edwards-Bailey, NW 27-10n-13w, a wildcat near the Jasper-Jones County line, is finding puzzling conditions. On drill-stem test in the Xmas sand zone of the basal Eutaw, it showed for condensate after finding salt water higher in the Eutaw section. Drilling continued and several sands in the upper Tuscaloosa have shown only water. Drilling will be carried to the Massive sand.

MISSISSIPPI WILDCAT COMPLETIONS

Adams County: Humble 1-A Stowers, beginning at SE cor. of section, go NW along NE line 537½ ft., then SW at right angles 537½ ft. to location, 9-8n-2w, dry, TD 10,012 ft., base Austin 9,128 ft.

Lauderdale County: Mid-Southern Drilling 1 Clark, NW SW 13-8n-17e, dry, TD 3,290 ft., Lower Cretaceous 3,060 ft.

Rankin County: Leonard Jones 1 Bullock, SE SE SE 10-4n-2e, dry, TD 6,220 ft., Eutaw 6,121 ft.

Smith County: Gulf Refining 1 Foley, SE NW 8-10n-13w, dry, TD 2,269 ft., cap rock 2,140 ft.

Warren County: Magnolia Petroleum 1 Ragsdale, 330 ft. south and 780 ft. east of NW SW SW 24-16n-4e, dry, TD 10,649 ft., Massive sand 8,849 ft.

ALABAMA WILDCAT COMPLETION

Clarge County: Plains Production et al 1 Chapman, NE NW 30-9n-3e, dry, TD 6,010 ft., Lower Cretaceous 5,204 ft.

Oklahoma City Selected For Drillers' Meeting

DALLAS.—Meeting here January 9, the board of directors of the American Association of Oilwell Drilling Contractors selected Oklahoma City as the meeting place for the fifth annual meeting of the association, to be held some time in October.

The directors discussed manpower, safety and insurance, accounting procedure, membership, publication of the association's magazine, revision of bylaws, district meetings, addition to staff, and housing. Considerable concern was expressed over both manpower and equipment requirements for the remainder of 1945, and the consensus was that the situation had been adversely affected by developments in the European war theater.

Look For
PRODUCT
120
For Better
Cementing Results
on Page
303
of the Baker
or Composite
Catalog

STOP PAYING TRIBUTE TO LEAKS

RECTORSEAL, the outstanding leak preventer, positively seals all connections. It's easy to apply. Just brush or swab it on the threads when making up connections.

Use RECTORSEAL on casing and tubing collar threads; drilling rig connections (mud, water and steam lines); separator and flow line connections; setting bolted steel tanks; Natural Gasoline Plants and Refineries (gasoline, steam and acid lines); engine and compressor gaskets; Gas and Water Distribution Systems.

Order RECTORSEAL from your supply store. Available in Gallons, Half-gallons, Quarts, Pints and Half-pints.

RECTOR WELL EQUIPMENT COMPANY, INC.

Fort Worth, Texas

Export: Lucey Export Corp., Woolworth Bldg., N.Y.C.

RECTORSEAL
THE POSITIVE LEAK PREVENTER

Among the

Drilling Contractors

Bosworth Drilling Co. has been awarded the drilling contract on the Big Lake Oil Co. 26-C University, which is slated as an east offset outpost to Ellenburger production in the Big Lake field in Reagan County, Texas. Location is 1,600 ft. east of nearest Ellenburger producers in that district.

Vierson & Cochran, drilling contractors of Okmulgee, Okla., are drilling the Mid-Continent Petroleum Corp. 1 Meadors, a wildcat in SE SW NW 20-9n-11e, east of Wetumka, in northeastern Hughes County, Oklahoma. The test will go to 4,200 ft. for the Wilcox sand, and will also test the Gilcrease and Cromwell.

Bryan Petroleum Co. is drilling contractor on the Seismograph Service Corp. and others 1 Harvey, in SW NW NW 4-15-11e, near the old Pollyanna pool of northwestern Okmulgee County, Oklahoma.

Harbar Drilling Co. has staked location for the 1 Cotton, a wildcat in SW SW NE 15-12-21w, Trego County, Kansas. Location is 1½ miles north and 1 mile west of the Ellis Northwest pool.

Stoner Drilling Co. is the contractor for the John Green, Jr. 1 Lucille G. Dawsey, in C SW SE 29-10n-4w, Choctaw County, Alabama. Contractor was waiting on rig.

Patrick & Tryyell Drilling Co. has been awarded the drilling contract, and was building derrick on the Gulf Refining Co. 1 V. G. Gholar, in the Gwinville field of Jeff Davis County, Mississippi.

Crow Drilling Co. has the contract and was rigging up on the Gulf Refining Co. 1 J. M. Andrews, in SE SW 6-1n-16w, in the Baxterville field of Mississippi.

T. J. Conway Drilling Co. had built derrick and was waiting on rig on its contract to drill the O. W. Killam, in NE NW 7-17n-8w, Washington County, Mississippi.

Bullington & Hollaway are the drilling contractors on the Wanete Oil Co. and Richard Lack 1 J. F. Craig, in SW NE 32-7n-14e, Lauderdale County, Mississippi. Contractors were rigging up.

Hewgley Drilling Co. has been awarded the drilling contract and was waiting on rig on the Sun Oil Co. 1 Leon Boyd, in NW NW NE 15-6n-8w, in the Mallalieu field of Lincoln County, Mississippi.

Ray & Woolf Drilling Co. was building roads on its contract to drill the Gulf Refining Co. 5 Mrs. L. P. Thornton, in NW SW 36-1n-12e, in the West Heidelberg field of Jasper County, Mississippi. On another Gulf Refining well in the same field, in NW NE NW 6-10n-10w, **M & M Drilling Co.** was also clearing roads.

Brown Drilling Co., Los Angeles, was awarded contract to drill a wildcat on the Davis property in Colusa County for Standard Oil Co. of California. This will be the second wildcat in the Princeton district.

Sam Brooks, California contractor, is preparing to spud a new outpost well for Associated Pipe & Engineering Co. in the La Habra district of Orange County on the Simmons property in Section 1-3s-11w.

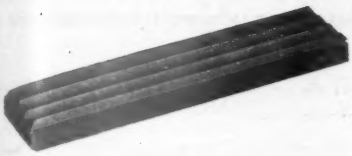
LET JOHN FIELD-MAN HELP YOU SOLVE YOUR NEXT WATER CONDITIONING PROBLEM!

Call
JOHN FIELD-MAN
ON YOUR NEXT
WATER CONDITIONING
JOB

LELAND HAMNER CO.

P. O. Box 1065 · Capitol 9758 · Long Distance LD 2175
2211 PRESTON AVE. HOUSTON, TEXAS

WEB WILSON
Tong Dies

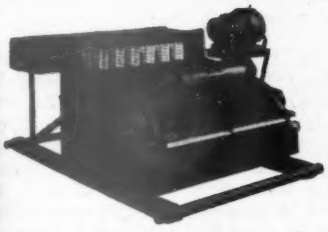


Sharp teeth are assured by our special method of milling developed and proved correct by several years of field use. No other dies can be sharper. This means long life and avoids slipping on hard joints.

SEE COMPOSITE CATALOG
PAGES 3101 TO 3120

WEB WILSON
Oil Tools
W. W. WILSON BUILDING
HUNTINGTON PARK, CALIF.

McNEELY
VIBRATING
MUD SCREEN



Handles the output from 20" mud pumps after surface hole is drilled. Average capacity 650 gallons per minute. Completely unitized. Screening surface—16 square feet. Domestic shipping weight less drive—1600 pounds. Headroom—27 inches. See Composite Catalog or write for details.

VERNON TOOL CO., LTD.
1101 MERIDIAN AVENUE,
ALHAMBRA, CALIF.
GULF COAST AND MID-CONTINENT REPRESENTATIVE
McNEELY MATERIALS CO.
2935 JENSEN DRIVE, HOUSTON, TEXAS

MARKET QUOTATIONS

Prices as of January 16, 1945

(This service is abbreviated because most refinery products are selling at the Government's price ceilings. Quotations on other products than those shown here furnished on request. Quotations are f.o.b. plant in tank cars and in cents per gallon.)

REFINERY GASOLINE

Octane (A.S.T.M.)	70†	70-74
Mid-Continent*	6.75	5.87½
Gulf Coast	6.75	5.82½
Northeast Coast		9.07½
California		6.50-7.00

*Basic Oklahoma Group 3. †1939 C.F.R. (research method).

NATURAL GASOLINE

Grades:	25-70	18-65
Oklahoma (Group 3)	4.750	5.700
North Texas (Dist. 1 Del.)	4.500	5.400
North Texas (f.o.b. plant)	4.375	5.250
North Louisiana (Dist. 1 Del.)	5.160	6.060
North Louisiana (f.o.b. plant)	4.375	5.250
California	4.875	5.500

CRUDE-OIL PRICES

Representative posted schedules per bbl	
East Texas	$1.32
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.93
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas	1.00

Note: Exclusive of subsidy.

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity:	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Texas*
18-18.9	$0.80			
19-19.9	.84		$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9		1.07	1.30	.94
32-32.9		1.09	1.32	.96
33-33.9		1.11	1.34	.98
34-34.9		1.13	1.36	1.00
35-35.9		1.15	1.38	1.02
36-36.9		1.17	1.40	1.04
37-37.9		1.19	1.42	1.06
38-38.9		1.21	1.44	1.08
39-39.9		1.23	1.46	1.10
40 and above		1.25	1.48	1.12

*Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT

Week ended January 6, 1945

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks — Gasoline	Distillate	Residual
East Coast	715	11,683	8,830	6,573
Appalachian	151	4,338	733	585
Ill., Ind., Ky.	770	19,296	6,068	3,097
Okla., Kan., Mo.	387	8,395	2,276	1,423
Inland Texas	229	2,832	393	658
Tex. Gulf Coast	1,133	15,193	7,132	9,556
La. Gulf Coast	245	4,738	1,665	1,305
North La., Ark.	79	2,589	676	238
Rocky Mountain	117	1,739	365	542
California	830	15,813	10,160	32,097
Total 1- 6-45	4,656	86,616	38,298	56,074
Total 12-30-44	4,798	86,614	39,495	57,430
Total 1- 8-44	4,226	76,924	41,004	54,570

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
January 6, 1945	220,331,000
December 30, 1944	222,998,000
January 8, 1944	238,114,000

*Excludes unrefinable California stocks.

WEIGHT INDICATOR POINTS

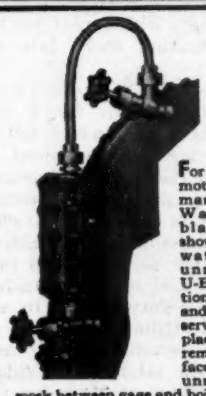
CONTROLLING RECORD BREAKING WELLS IS MARTIN-DECKER'S SPECIALTY

This business of furnishing control instruments for world's record wells is becoming a fixed habit with Martin-Decker. For over 18 years in every country in the world where a new depth record has been established, Martin-Decker's drilling control instruments have been used.

But whether you go deep or shallow, there's a Martin-Decker instrument made to meet your drilling needs. To complete better wells, make your choice MARTIN-DECKER.

MARTIN-DECKER CORP.
LONG BEACH, CALIFORNIA
A. F. McQUISTON, BAKERSFIELD, CALIFORNIA
REED ROLLER BIT CO., HOUSTON, TEXAS

PENBERTHY
"REFLEX"
WATER GAGE SET



For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

PERSONALS

Laboratory Chief Distinguished As Inventor

GALE L. ADAMS, recently promoted to manager of the laboratory department of General Petroleum Corp.'s refinery at Torrance, Calif., has gained distinction as an inventor, and he holds 12 patents, covering a method of crude dehydration and various refining processes. Adams joined General Petroleum in 1925, taking part in laboratory and geophysical operations till 1935, when he was made supervisor of process laboratories. In 1941 he was advanced to assistant manager of laboratories, which post he held till his promotion early this year to manager.

Before entering General Petroleum's service Adams for 5 years was a member of Standard Oil Co. of New Jersey's development department. In 1943 he was appointed to the refinery process committee of Socony-Vacuum Oil, Inc., of which General Petroleum is a subsidiary. This committee passes on all processes which come up for consideration of Socony-Vacuum and its subsidiaries and affiliates.

Before he became directly associated with the oil industry Adams was an instructor at Michigan College of Mines and Technology at Houghton. He is chairman of the aviation gasoline committee for District 5, Petroleum Administration for War.

Sylvester Paul Kelly, who was assistant director of the railway department of Office of Defense Transportation, has been named assistant refinery traffic manager for Cities Service Oil Co. (Del.) at Bartlesville, Okla., under **A. C. Holmes,** manager. While with ODT, which he joined in April 1942, Kelly directed the rail movement of petroleum products throughout the United States.

Paul L. Lyons, formerly chief scout for Stanolind Oil & Gas Co. in Tulsa, has joined Warren Petroleum Corp. as assistant to **D. L. (Mitch) Connelly,** manager of Warren's crude-oil division, in Houston. **Pat M. Broach,** with Stanolind 15 years, has been made acting chief scout, filling Lyons' place. **Erwin McGowan,** recently relieved of duty in the Army, has joined Stanolind as scout in East Texas.

W. Carroll Kelly, formerly vice president and general manager of Snowden & McSweeney Co., New York, has joined Allied Oil Corp., Chicago, as manager of its production department.

E. C. Seymour, Dallas, has been elected treasurer of Magnolia Petroleum Co. and Magnolia Pipe Line Co. He will continue as comptroller, a position he has held since 1942. Seymour has been with Magnolia since 1912. He succeeds **W. L. Holmes,** who retired as treasurer after serving the company 32 years.

Paul G. Blazer, chairman of Ashland Oil & Refining Co., Ashland, Ky., has been elected to the board of directors of the Cincinnati branch of the Federal Reserve Bank of Cleveland.

Dr. Elmer K. Bolton, chemical director of E. I. du Pont de Nemours & Co., was awarded the Perkin Medal, highest honor in applied chemistry, by the American Section of Society of Chemical Industry. He was particularly recognized, the citation said, "for his leadership in the synthesis of neoprene, first general-purpose synthetic rubber."

Ivan G. Burrell, formerly division petroleum engineer for The Ohio Oil Co., has been promoted to district superintendent, with headquarters at Bridgeport, Ill., succeeding **John F. Reglin,** retired. Burrell graduated in engineering from Colorado School of Mines in 1931 and joined Ohio shortly afterward. **Millard H. Flood,** who was assistant division petroleum engineer, has been advanced to Burrell's former post.

Thomas A. Dines, president of the Utah Oil Refining Co. and of the United States National Bank, of Denver, has been elected vice chairman of the bank's directors, succeeding **A. A. Reed,** retired. He will continue as president of the bank.

W. Oscar Temple, a director of the Mountain Producers Corp., has been named a director of the United States National Bank, of Denver.

H. O. English, former president of the Rocky Mountain Oil Scouts Association, has resigned to become executive secretary of the Rocky Mountain Oil & Gas Association, with headquarters at Casper.

Harry Wheeldon, newly elected vice president in charge of operations for The Shamrock Oil & Gas Corp., joined the company as operating manager October 15, 1943, and has been in charge of its McKee plant near Dumas, Tex., since that time. Wheeldon now will be in charge of all Shamrock operations, including the refining, production, and exploration departments.

Dr. J. A. McBride, who recently joined the product development division, chemical products department, of Phillips Petroleum Co., Bartlesville, Okla., received his doctor's degree in organic chemistry from University of Illinois in June 1944. Following undergraduate training in chemistry at Miami University, Oxford, Ohio, he was awarded a master's degree by Ohio State University in 1941.

T. J. Casey and **R. E. Foss** have been elected vice presidents of the California division, Barnsdall Oil Co., and assumed their new posts on January 4. Casey has been affiliated with Barnsdall Oil Co. for 17 years, having been with the legal department at Tulsa prior to his transfer to California in 1932. On August 10, 1943, he was appointed manager of the land department and this year was elevated to vice president in charge of lands and leases.

McCORD
Class S.F.
LUBRICATORS
A modern lubricator for modern service on Diesel, gas, steam engines and compressors. Supplies dependable cylinder lubrication in metered quantities reducing friction and wear. Capacities: 2 to 24 pt. and 1 to 16 feeds. New catalog on request.

RESULT OF 40 YEARS' LUBRICATOR BUILDING EXPERIENCE
McCORD RADIATOR & MFG. CO. DETROIT, MICHIGAN LUBRICATOR DIVISION

St. Louis
HOTEL MAYFAIR
DOWNTOWN ST. LOUIS AT YOUR DOORSTEP

Foss, a graduate of California Institute of Technology, will supervise all field operations.

Capt. Maurice E. Cloutier, who was a geophysicist for Shell Oil Co., Inc., in the Texas-Gulf area before he entered war service and is now a flight commander in an undisclosed theater overseas, was recently awarded the Distinguished Flying Cross for extraordinary achievement. Previously he had received two Presidential Citations and the Air Medal with 10 Oak Leaf Clusters.

Robert J. Brauer, formerly a chemical engineer at the Wood River plant of Standard Oil Co. (Indiana) and recently with the U. S. Army in Italy, has been promoted to major. Major Brauer, who served in England, Scotland, Algeria, Tunisia and Sicily before going to Italy, is a specialist in German rocket weapons. **Robert H. Hahn,** who was a research chemist for the same company at its Sugar Creek, Mo., plant, has also been commissioned a major. He is in the inspection section, technical branch, fuels and lubricants division, office of the quartermaster general, in Washington.

V. E. Liles, administrator for Stanolind Oil & Gas Co., Tulsa, has been elected a director, taking the place of the late A. M. McCorkle. Liles has been associated with Stanolind since its organization in 1930. Before that he was with Dixie Oil Co.

Daniel Pryzel has retired as director and vice president in charge of research of Shell Union Oil Corp. Pryzel, a veteran of 40 years' experience in the industry, is credited with important advances in the petroleum chemical field in the past 30 years. He was born in Holland and joined the Shell Group in 1906. He was a pioneer in development of the cracking process. **Gayer G. Dominick,** New York, was named to take Pryzel's place as director.

Frank A. Watts, Houston, since 1938 purchasing agent for Humble Oil & Refining Co., has been named sales manager, under the general direction of **Hines H. Baker,** vice president in charge of manufacturing and sales. Watts, whose post is a new one, joined Humble in 1918. For 15 months he served as director of the materials division, Petroleum Administration for War. He is succeeded as purchasing agent by **F. T. Fendley,** formerly Watts' assistant.

J. A. Mull, Oklahoma City, geologist in charge of Oklahoma operations for Superior Oil Co. of California, plans to leave about January 25 on a 30-day business trip to the Bahamas, traveling in a company plane.

HINTS ON OLD ROPE FROM NEW BEDFORD

Today with war sources getting the major part of our rope output, we at New Bedford offer our customers advice on how to get maximum service from the available supply. And just as we make good rope, we try to give good advice—practical down-to-earth hints on how you can get the most service life from the rope you have.
THEY'RE IN THIS BOOKLET

entitled "Care and Conservation of Rope" which will be sent you on request. It contains directions on how to use... how to splice... strength tables for different sizes and weights. Write for your copy.
7714
NEW BEDFORD CORDAGE CO.
233 BROADWAY • NEW YORK 7, N. Y.
Mills: New Bedford, Massachusetts

PENBERTHY
LUBRICATING DEVICES

Glass body oilers, sight feed lubricators. Plain oil and grease cups, spring compression and screw plunger grease cups, engine lubricators . . . these are among the Penberthy lubricating devices that are so widely used in the oil industry because they have always been dependable under the most severe conditions.
PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

Classified Advertising

UNDISPLAYED RATE

8 CENTS A WORD, minimum charge $2 per insertion.
SITUATIONS WANTED, 4 cents a word, minimum charge $1.
BOX NUMBERS, count 9 words when replies are to be sent to our Tulsa Office.
10% DISCOUNT if 3 insertions are ordered at one time, with check accompanying order.

All classified advertising payable in advance.

DISPLAYED—PER INCH

Classified display advertising set in single or double column style:

1 inch	1 time	$7.00
1 inch	13 times	6.50
1 inch	26 times	6.00
1 inch	39 times	5.50
1 inch	52 times	5.00

Rates are governed by total space used within 12 months from date of first insertion. Credits are allowed when lower rates are earned.

FORMS CLOSE 9:00 A.M. MONDAY Advertising will be accepted in order received, to extent of available space. Published Each Saturday

HELP WANTED

SALES ENGINEERS, preferably with chemical or mechanical background, wanted by well-known industrial instrument company looking forward to post-war expansion. Work requires persistence and ability to cooperate as consultant with prospects rather than high pressure selling. Positions open in several sections of the country. Box A-347, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Experienced driller on salt wells. Steady work guaranteed right man. Box A-386, The Oil and Gas Journal, Tulsa Oklahoma.

CHEMISTS—ENGINEERS
PHYSICISTS

Men interested in careers in industrial research are urged to write us giving details of training and experience. Essential work with promising postwar future offering opportunities for professional growth.

BATTELLE MEMORIAL INSTITUTE
COLUMBUS 1, OHIO

MEN FOR FOREIGN EMPLOYMENT
Limited number desirable positions open in Saudi Arabia:

Petroleum, electrical and mechanical engineers; radio operators and technicians; Diesel and tractor mechanics; air-conditioning and refrigeration mechanics; stabilizer operators; utility operators; surveyors; accountants; stenographers; typists. Employment offers splendid opportunities for post-war security and advancement. Liberal benefit plans; vacations in United States; free hospital and medical care. If genuinely interested in foreign career, send full information on experience, transcript of college record (professional applicants only), references, draft and availability status to our Relations Department.

ARABIAN AMERICAN OIL COMPANY
200 Bush Street
San Francisco 4, California

HELP WANTED

WANTED by consulting organization: Petroleum engineers with Hayward mud logging experience or its equivalent. Immediate openings in Venezuela, excellent opportunity for advancement to managerial positions throughout the world. Box A-290, The Oil and Gas Journal, Tulsa, Okla.

WANTED: MECHANICAL ENGINEER who knows something about drafting. John Zink Company, 4401 South Peoria, Tulsa, Oklahoma.

HELP WANTED
Experienced Abstracter. Permanent place. Blaine County Abstract Co., Watonga, Oklahoma.

DRAFTSMEN

For Process Piping on Oil Refineries

Applications solicited from men not now employed in essential work or those completing essential work who have Statements of Availability

ARTHUR G. McKEE & CO.
2300 Chester Avenue
Cleveland, Ohio

CHEMICAL ENGINEER WANTED: Chemist or Chemical Engineer with Bachelor's Degree wanted to supervise essential natural gas processing plant laboratory. Southwest location. Should have several years experience refinery or larger natural gasoline plants. Submit complete details education, experience, personal data, salaries received and expected, recent photo. Employment subject to W.M.C. regulations. Box A-381, The Oil and Gas Journal, Tulsa 1, Oklahoma.

MECHANICAL ENGINEER DESIGNER
Well-equipped iron and steel plant in New Orleans now manufacturing ship parts—with structural steel, machine shop, and drop forge facilities—requires experienced designer of oil-field drilling and production equipment and oil refinery equipment. One thoroughly grounded in welding fabrication, both manual and automatic, preferred. The man we want must be capable of designing a product—and following it through production. Please give details of activities over past 10 years, send small photo and advise salary expected.
George Irving Machine & Iron Works
3426-30 Short Street, New Orleans, La

INDUSTRIAL INSTRUMENT TECHNICIANS WANTED

for process plant located in central United States. War plant engaged in essential work for war effort. Must be experienced in repair and adjustment of flow controllers, temperature and pressure regulators, etc. Excellent opportunity. Allowance for moving and personal traveling expenses. Give detailed outline of previous experience, education, age, draft status and rate of pay required.

Box A-382
The Oil and Gas Journal
Tulsa, Okla.

HELP WANTED

WANTED: Experienced Refinery Instrument Man. Base pay $1.07 an hour, work week 48 hours, time and one-half for overtime. Permanent job for right man. Box A-371, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPING DRAFTSMAN AND CHECKER Petroleum industry. Chicago location. Experienced high pressure refinery piping layouts. Actual oil refinery piping experience desirable although not necessary. Give complete details in first letter. Box A-351, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

MEXICO: College graduate in law 10th now 45 years old, desires to locate in Mexico City because of climate and represent manufacturers of oil field supplies or others on a drawing account commission basis. Experience eight years on Wall Street, New York, and nine years as independent oil producer in Louisiana, Arkansas, and Illinois. Box A-229, The Oil and Gas Journal, Tulsa, Oklahoma.

RIVER TRANSPORTATION man of wide experience desires position as superintendent or Assistant of river transportation department. Now employed by Major company. Can furnish A-1 references from present and past employers. Write Box A-378 The Oil and Gas Journal, Tulsa, Oklahoma.

TWENTY years, experience in operations topping, cracking, gas compression and recovery, light ends fractionation, light and heavy treating. Have statement of availability. South or west. Box A-365, The Oil and Gas Journal, Tulsa, Oklahoma.

NATURAL Gas Engineer desires change. Fifteen years experience with majors and independents in engineering, contracts, measurement, accounting and taxation for gas and distillate fields, gasoline and cycling plants. Particularly familiar with unitized operations. Box A-372, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION DEPT.: Experienced in all production and drilling operations. Will join aggressive company in any capacity from field foreman to general superintendent. Box A-361, The Oil and Gas Journal, Tulsa, Oklahoma.

Aggressive, experienced, production man desires connection in oil production or selling activity in Tulsa area. Have law degree and can handle title work. Early forties. 4-HA. Box A-384, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: B. S. degree and graduate studies in engineering and geophysics; extensive and varied experience with major oil companies and independent operators in domestic and foreign fields; seeks position with oil company or well financed individual operator. Box A-380, The Oil and Gas Journal, Tulsa, Oklahoma.

MIDDLE age man experienced in Land Titles—Leases—Rentals, etc. wishes employment. Either office or field. Any location. Box A-385, The Oil and Gas Journal, Tulsa, Oklahoma.

RANCHES AND FARM LANDS

FOR SALE
Ranch near Walsenburg, Colorado, 90,000 Acres. Has railway through place. Has fresh water stream through ranch. Good hunting, fishing. About 50,000 A. valley land. Water to irrigate 4000 A. All fenced. 2 houses. Good roads. ½ minerals goes with land. Price $4.25 per acre.

10,000 Acres, 7 miles east of Las Vegas, New Mexico. Modern 7 room house. Good grass. Plenty of good fresh water and several mills. Barns and outbuildings. All fenced. Minerals intact. Price $5.25 per acre.

Near Roy, New Mexico, 10,000 acres deeded and 10,000 acre lease on Canadian River. Good grass. All minerals. Good fishing, hunting. Price $7.00 per acre. C. O. Walling, Box 695, Phone 306, Burkburnett, Texas.

SOUTH TEXAS CATTLE RANCH
Over 50,000 acres. Well improved. Splendid oil and gas possibilities. $9.00 per acre. For details write Wm. F. Schutz, 311 Navarro St., San Antonio, Texas.

PATENT ATTORNEYS

PATENTS, Trade-Marks, Booklet, "General Information Concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 418, Bowen Bldg., Washington 5, D. C.

FOR RENT

Tulsa Office Space
Sublet medium size private office, available Feb. 1. Excellent address. If you need furniture present tenant would sell reasonably. Box A-383, The Oil and Gas Journal, Tulsa, Okla.